

U. S. ARMY SIGNAL CENTER AND FORT GORDON
Fort Gordon, Georgia 30905-5180

LESSON PLAN

TITLE: Introduction to the Central, Message Switching,
Automatic AN/TYC-39A

LEARNING

OBJECTIVE: Action: The student will describe the basic functions and capabilities of the AN/TYC-39A and identify subassemblies, peripherals and their locations using TM 11-5805-790-12 and TM 11-5805-790-34 series.

Condition: The student will be given an AN/TYC-39A, TM 11-5805-790-12, TM 11-5805-790-34 series and 150-74G10/D01-LP1-PE.

Standard: Standard is met when the student can correctly identify subassemblies, peripherals and their locations and answer 14 out of 20 questions on the practical exercise in 1 hour.

SAFETY

CONSIDERATIONS: There are no safety consideration for this lesson plan.

RISK ASSESSMENT: A risk assessment has been conducted on this unit of instruction and the risk level is deemed to be: LOW RISK.

RESOURCE
NEEDS/

REFERENCES: AN/TYC-39A, Overhead Projector, Slides 1-4, TM 11-5805-790-12, TM 11-5805-790-34 series and 150-74G10/D01-LP1-PE.

METHODS OF

INSTRUCTION: Conference, Demonstration, Practical Exercise.

150-74G10/D01-LP1

1

APPROVAL DATE: 24 NOV 97

DEVELOPER: SFC CARTAGENA

DIV. CHIEF: Jack P. Rendon

TIME: 8 Hours

NOTES TO INSTRUCTOR:

1. Ensure that the classroom is available and properly set up and that all equipment and training resources are available and in working order.
2. Ensure that enough technical manuals and Systems Student Guides (**HAND OUT SYSTEMS STUDENT GUIDE TO AID IN FAMILIARIZING STUDENTS THROUGHOUT THE COURSE**) are available and account for all transparencies.
3. Before the end of class, evaluate students on their ability to perform the learning objective.
4. State all safety notes as they appear throughout the lesson plan.

NOTE: Show Slide D01-LP1-1.

INTRODUCTION:

- Elapsed Time
1. The AN/TYC-39A message switch is a transportable automatic message communications system. In various modes of operation, the switch can interface a number of line types with both dedicated and switched data lines and trunks.
 2. The message switch will interact with the AN/TTC-39D(PS) which is a circuit switch that processes telephone calls. Even though the switches perform different missions, they complement each other in the tactical world of communications.
 3. Let's begin our study by looking at the development of tactical message switching.

3M

BODY:

1. Background.
 - a. The U.S. Army has utilized message switching for many years. The Department of Defense (DOD) automatic digital network (AUTODIN) has processed messages since 1967. However, this

capability was available only at the worldwide or strategic level. AUTODIN handled some local theater message traffic, but generally, the tactical commander relied on point-to-point teletype and data systems.

- b. When traffic was routed to more than one addressee or relayed to a remote addressee, it was transmitted via torn-tape relays or manual procedures. This process was slow, tedious, and resulted in delays and backlogs of tactical message traffic. Because of major changes in command, control and intelligence systems, a more efficient means of sending messages was necessary. The AN/TYC-39 (V) was developed to fill this need.

NOTE: Show Slide D01-LP1-2.

- c. The AN/TYC-39 (V) has immediate benefits for tactical commanders. It expands the number of subscribers who can access the AUTODIN system and processes DOD information at all levels of classification. It also utilizes newer and more efficient communications security (COMSEC) equipment, resulting in greater security. Ultimately, it assures commanders that important messages will be delivered with greater reliability.

NOTE: Show Slide D01-LP1-3.

- d. The AN/TYC-39 (V) was updated to be an integral part of the digital communications systems of the future. The newest upgrade the AN/TYC-39A works jointly with the AN/TTC-39D(PS) and is part of the Army's Integrated Tactical Communications System (INTACS). Interfaced with the circuit switch, the need for separate message traffic circuits is eliminated.
- e. One circuit switch network can accommodate both voice and data traffic. With dial-up data terminals, subscribers no longer need separate lines for voice and message terminals. These features will provide

better use of multiplex and transmission facilities.

QUESTION: By what method did older communications systems transmit messages? (ANS: Manual torn-tape relays and AUTODIN.)

30M

2. AN/TYC-39A message switch overview.

NOTE: Show Slide D01-LP1-4.

a. Description.

The AN/TYC-39A message switch provides secure, automatic, processor controlled, store-and-forward message switching capabilities for a network consisting of both dedicated and circuit switched subscriber terminals. The message switch is housed in a modified S-280 shelter that is fully insulated and weatherproofed and can be transported by air and ground vehicle.

b. Purpose.

Message switching is accomplished by receiving and storing a full message from another message switch, a circuit switched data device, an automatic voice network (AUTOVON) switch, or a dedicated subscriber, then forwarding the message to the intended recipient. The message switch is capable of converting between various subscriber formats, information rates, character codes, and channel signaling schemes. This provides compatibility with a wide range of varying equipment within the network.

c. Configurations.

The AN/TYC-39A is a 48-line single shelter message switch (MS).

NOTE: Point out that message switching terminology
150-74G10/D01-LP1 4

will sometimes be different from telephone switching terminology. In this instance, the term "line" is used. In message switching, the term "line" signifies the same meaning as the terms "loop" and "trunk" do in telephone switching.

The basic functions of the MS are accepting, processing, storing, and accounting for message traffic, performed under the control of the central processor group (CPG) and a program library disk (PLD). The MS also performs various bookkeeping and administrative functions required to ensure security and to provide performance data for management evaluation. Message processing is performed on a first-in-first-out (FIFO) basis by message precedence.

QUESTIONS: What combination of devices controls the basic functions of the MS? (ANS: The CPG and a PLD.)

How many single subscribers may be connected at any one time? (ANS: 48.)

What other type of systems may be connected to the MS? (ANS: Another MS or circuit switch.)

1H 15M

3. Utilization of the TM 11-5805-790-12 and TM 11-5805-790-34 series.

NOTE: Refer students to Volume I, page E. This tells the student "how to use the manual". Go through each manual to ensure that the students understand what is contained in each manual.

a. Table of Contents.

- (1) Main Table of Contents. (Page ii)
- (2) Table of Contents in each volume.

b. Front cover index.

- (1) Major subjects - in box.

- (2) Page edge - marked in black.
- c. Chapter index.
- d. Section and paragraph index.
 - (1) Specific supervisory command.
 - (2) Traffic printout.
- e. Alphabetical index.
 - (1) Located in back of each volume.
 - (2) Important items listed under names.
- f. Procedure steps.
 - (1) Numerical order by drawing number.
 - (2) Usually left to right.
- g. Foldouts.
- h. Flowcharts.

QUESTIONS: In what volume, section, and page would you find the "Operating Procedures" for Traffic Service Operation? (ANS: Volume II, Chapter 4, Section III, para 4-1, page 4-19.)

What is contained in Volume VI, Chapter 8?(ANS: Preventive Maintenance Checks and Services.)

What foldout number would show the "Message Switch Block Diagram"? (ANS: FO-1.)

In what manuals would you find the wire run lists? (ANS: TM 11-5805-790-34-2-1,2,3.)

2H

- 4. Location of subassemblies and peripherals demonstration.

NOTES: A tour of the message switch will be given. The class will be divided into groups of two for the tour. Give a brief overview of the MS and point out the location of the different subassemblies and peripherals.

Allow the students to ask general questions they may have pertaining to the AN/TYC-39A message switch.

The students remaining in the class will be required to read the following paragraphs in Volume I: (paragraphs 1-7 through 1-16). Upon completion of the tour, questions will be asked from the text of the required reading assignment.

a. Central processing group (CPG).

(1) Function.

Under software program control and with it's peripheral devices, it provides the operator/machine interface needed to perform message processing functions and overall control of the message switch.

(2) Components.

- (a) Central processor unit (CPU) (2).
- (b) Status and control panel (SCP).
- (c) Input/output units (IOU) (2).
- (d) Solid state memory (SSM) (2).
- (e) Floppy disk drives (FDD) (2).
- (f) Storage device units (SDU) (6).
- (g) Line printer units (LPUs) (2).
- (h) DC/DC converters.

b. Video display terminal/keyboard (VDT/KB)
(3).

(1) Function.

Provides the primary operator/machine interface with the message processor.

(2) Three positions.

- (a) Traffic service position.
- (b) Supervisor position.

- (c) Maintenance position.
- c. Communications group (CG).
 - (1) Function.

These components assist in coordination, troubleshooting, and other control functions.
 - (2) Components.
 - (a) Intercom station.
 - (b) Telephone (TA-838 or TA-954).
 - (c) Digital subscriber voice terminal (DSVT) TSEC/KY-68.
- d. Configuration and alarm panel (CAP).
 - (1) Function.

Provides a means for automatic configuration of automatic data processing (ADP) peripheral equipment, on-line or off-line. Also identifies fault conditions that might exist and initiates the switchover to the backup ADP if necessary.
 - (2) Components.
 - (a) Switches for manually selecting the processor that connects all peripheral devices to the processor.
 - (b) Program load switches
 - (c) Alarm indicators.
 - (d) Processor status indicators.
- e. Power group (PG).
 - (1) Function.

Provides the control, conversion, distribution, and monitoring of all internal voltages. It also furnishes backup power to critical

loads in case of a prime power failure.

(2) Components.

- (a) Power entry panel.
- (b) AC-to-DC power control panel.
- (c) AC power distribution panel.
- (d) Regulator/battery charger.
- (e) Battery bank.
- (f) DC power distribution panel.
- (g) Power processor.
- (h) DC-to-AC inverter.

QUESTIONS: What component of the MS provides the primary operator/machine interface with the message processor? (ANS: VDT/KB.)

What component of the MS is used to manual select what processor will be used on line? (ANS: CAP.)

f. Communications equipment support group (CESG).

(1) Function.

Provides equipment to interface a variety of lines that may be connected to the message switch and to monitor the status of the CESG facilities.

(2) Components.

- (a) Patch panels.
- (b) Loop modems.
- (c) Common equipment facility (CEF)
- (d) Line conditioning monitoring equipment (LCME) test, measurement, and diagnostic equipment (TMDE).
- (h) Modem control and status (MCS).

b. Communications interface group (CIG).

(1) Function.

Provides the interface between the line terminations and the CPG. The

CIG also monitors modem, crypto,
and shelter alarms.

(2) Components.

- (a) Intelligent line interfaces (ILI).
- (b) Digital line concentrators (DLC).
- (c) Master timing generator (MTG).

c. Common equipment facility (CEF).

(1) Function.

The CEF houses the rack-mounted
COMSEC equipment, which provides
security for time-division trunks
and dedicated subscriber terminals.

(2) Components.

- (a) KG-82 loop key generator (LKG).
- (b) HGX-82 LKG and common unit (CU).
- (c) KG-81 or KG-94 trunk encryption
device (TED).
- (d) KG-83 key variable generator (KVG).
- (e) HGX-83 automatic key distribution
center (AKDC).
- (f) HGX-84 interface control unit
(IFCU).

d. Time-division interface group modified
(TDIGM).

(1) Function.

Interfaces with a circuit switch
through a digital transmission
group (DTG).

(2) Components.

- (a) Remote transfer switch.
- (b) TICAD/ATLDY.
- (c) TIGMOW.
- (d) Signaling buffer controller (SBC).
- (e) Group multiplexer and
demultiplexer.
- (f) Loop key generator adapter.

- (g) Trunk signaling buffer (TSB).
- (h) Trunk encryption device (TED).
- (i) Group modem.
- (j) Patch panels.

QUESTIONS: In what equipment group is the rack-mounted COMSEC equipment housed? (ANS: CEF.)

Patch panels, modems, intercom station, and DSVT are components of what group of equipment? (ANS: CESSG.)

NOTE: The practical exercise will be completed by the students that are not in the message switch on tour.

5. Practical exercise.

a. Explanation to students. This is a two-part practical exercise.

- (1) Part One. Using the AN/TYC-39A; TM 11-5805-790-12-1; and Practical Exercise, 150-74G10/D01-LP1-PE you will identify and list the components of the MS and it's associated equipment group within 30 minutes.
- (2) Part Two. You must correctly answer 14 out of 20 questions pertaining to the MS equipment groups within 45 minutes.
- (3) Use the figures in the practical exercise to list the required information.
- (4) When you finish the practical exercise, have the instructor evaluate your performance.
- (5) If what you are required to do is not clear, ask your instructor for clarification.

b. Application by students.

- (1) Part One. Using the AN/TYC-39A; TM 11-5805-790-12-1; and Practical Exercise, 150-74G10/D01-LP1-PE the students will

identify and list the components of the MS and its associated equipment group.
(2) Part Two. Using TM 11-5805-790-12-1 and Practical Exercise 150-74G10/D01-LP1-PE the students will answer questions pertaining to the MS equipment groups.

- c. Evaluation. During Part One of this practical exercise, evaluate each student to ensure the student has the ability to list the components and equipment groups of the MS within 30 minutes. In Part Two, evaluate each student to ensure the student can correctly answer 14 out of 20 questions about the MS equipment groups within 45 minutes.

QUESTIONS: What interfaces the MS with the CS? (ANS: Digital transmission group (DTG).)

Messages are handled in accordance with what priorities? (ANS: Precedence levels and classification.)

What purpose do patch panels serve in the message switch? (ANS: Reconfigure and bypass equipment during maintenance operations and to monitor signal output.)

NOTE: It is recommended, that whenever possible, the students begin practicing power-up and initialization procedures of the message switch and equipment from this time forward. This will facilitate in teaching the more complex areas of the message switch.

SUMMARY:

You have been introduced to the AN/TYC-39A message switch and the TM 11-5805-790-12 series of TMs. During future classes, these will be used extensively to study components that make up the message switch and ultimately the maintenance procedures necessary to perform fault isolation.

8H

END

This document supports Task Number 113-603-2198.

PRACTICAL EXERCISE
D01-LP1
ANSWER KEY

1. CSCE
TTC-39D(PS)
TYC-39
2. B
3. C
4. C
5. D
6. A
7. C
8. B
9. D
10. C
11. C
12. 2
13. 5
14. 2
15. YAVL
16. The AN/TYC-39A message switch provides secure, automatic, processor controlled, store-and-forward message switching capabilities for a network consisting of both dedicated and circuit switched subscriber terminals.
17. D
18. Asynchronous
Simplex
No automatic error and channel control
Not reversible on a message basis
19. PLD
20. Coaxial twisted pair

U S ARMY SIGNAL CENTER AND FORT GORDON
Fort Gordon, Georgia 30905-5180

LESSON PLAN

TITLE: Power Initialization of the AN/TYC-39A.

LEARNING

OBJECTIVE: Action: In Part One, the student will perform AN/TYC-39A power initialization procedures. In Part Two, the student will answer written questions about power initialization procedures.

Conditions: The student will be given an operational AN/TYC-39A, TM 11-5805-790-12-1, TM 11-5810 series of manuals on COMSEC equipment, and practical exercise 150-74G10/D01-LP02.

Standard: Acceptable performance is achieved when in Part One, the student correctly performs power initialization procedures within 25 minutes. In Part Two, acceptable performance is achieved when the student correctly answers 7 of 10 written questions within 30 minutes.

SAFETY

CONSIDERATIONS: This lesson has safety hazards which may cause electrical shock or physical injury. Make sure students remove all jewelry and metal objects such as watches, rings, bracelets, and identification tags.

RISK

ASSESSMENT: LOW.

RESOURCE

NEEDS/

REFERENCES: Operational AN/TYC-39A, TM-11-5805-709-12-1, TM 11-5810 Series of manuals on COMSEC equipment,

150-74G10\D01-LP02

1

APPROVAL DATE: 25 NOV 97

DEVELOPER: SFC CARTAGENA

DIV CHIEF: *Jack P. Rendon*

practical exercise 150-74G10/ D01-LP02-PE,
overhead projector, and Slides 1-31.

METHODS OF
INSTRUCTION: Conference, Demonstration, Practical Exercise.

TIME: 8 Hours

NOTES TO INSTRUCTOR:

1. Ensure all training resources are available.
2. Ensure all safety procedures and practices are followed.
3. Ensure all equipment is operational.
4. Evaluate students on their ability to perform the learning objective during the practical exercise.
5. Check page count at end of class, before students are released, for all COMSEC documents that are issued to the students.

INTRODUCTION:

- Elapsed Time
1. If you purchase a new electrical appliance or product today, you will receive a manual or pamphlet containing the instructions to follow in order to operate it safely. As the operator of the AN/TYC-39A Message Switch, you will be required to power up the shelter and equipment of the message switch. Your knowledge of the proper power initialization procedures will ensure the protection of personnel and the successful deployment of the message switch.
 2. This lesson will teach you the skills and knowledge necessary for you to perform power initialization for the AN/TYC-39A. You will learn the procedures to follow when performing power initialization.

You will then practice power initialization procedures until you have demonstrated the ability, in Part One, to perform power initialization procedures within 25 minutes and in Part Two, correctly answer 7 of 10 written questions within 30 minutes.

3. Let's begin our study by discussing the power initialization procedures that you will be using when operating the AN/TYC-39A message switch.

3M

BODY:

1. Power initialization.

Purpose and use.

NOTE: Refer students to TM 11-5805-790-12-1, para 2-25, pg 2-44 and have them follow along in the TM.

- a. Power initialization procedures provide a safe sequential start-up procedure designed to protect the equipment and personnel within the message switch AN/TYC-39A.
- b. Power initialization is performed in two parts:
 - (1) The first procedure is a check to ensure that the selected shelter is in a shutdown condition.
 - (2) The second procedure is a sequential start-up procedure.

QUESTION: What are the two parts of power initialization procedure? (ANS: Check shutdown condition and sequential start-up.)

10M

2. Power initialization procedures.

- a. Perform system shutdown checks.

CAUTION

STUDENTS NOT TO ATTEMPT TO REPEATEDLY CLOSE A CIRCUIT BREAKER.

NOTE: Show Slide D01-LP02-1, pg 2-44.

- (1) Your first step is to check the ground strap connections. To do this, loosen the wing nuts holding the side shields on the power entry panel cover and raise the cover.

Check that the ground strap has been connected to the ground stud on the power panel and to the ground rod.

NOTE: Show Slide D01-LP02-2.

- (2) Next, check that the ECU power circuit breakers CB1/ECU1 and CB2/ECU2 are off. The circuit breakers CB1/ECU1 and CB2/ECU2 have a clear plastic dust cover. The circuit breakers are turned off and on through the dust cover.

NOTE: Show Slide D01-LP02-3.

- (3) Next, lower the power entry panel door and remove the shelter door port by turning the eight captive screws on the port cover counter-clockwise and remove the cover. (Any time the shelter is occupied and the system is not operating but the door is closed, the shelter door port must be open for your safety.) Open the shelter door and enter the shelter.

NOTE: Show Slide D01-LP02-4, pg 2-45.

- (4) Next, inside the shelter locate the power control panel and check the following controls for a shutdown condition:
- (a) Control AC circuit breakers, Phase A, Phase B, and Phase C are pressed in and that the Control DC is pressed in.
 - (b) DC control circuit breaker, OFF.

- (c) Comfort fan toggle switch, OFF.
- (d) Comfort fan/emergency lights circuit breaker, ON.
- (e) Main lights circuit breaker, OFF and main power circuit breaker, OFF.

30M

NOTE: Show Slide D01-LP02-5, pg 2-46.

- (5) Now, check that each individual overhead fluorescent light switch is off.

NOTE: Show Slide D01-LP02-6.

- (6) Next, check that the following circuit breaker panel controls are OFF:

- (a) Shelter lights main and emergency switches.
- (b) All DC and AC group circuit breakers.

NOTE: Show Slide D01-LP02-7, pg 2-47.

- (7) Shut off DLC POWER circuit breakers.

Set DLC A Slots 1-9 and DLC B Slots 10-18 circuit breakers to OFF

NOTE: Show Slide D01-LP02-8.

- (8) Next, at the battery box check that CB11 and CB12 are off by squeezing the two red tabs together.

NOTE: Show Slide D01-LP02-9, pg 2-48.

- (9) Next, at each CPG power supply, set POWER on/off switch to OFF. (PS14 & 15)

NOTE: Show Slide D01-LP02-10

- (10) Next, at the POWER PROCESSORS panels, set AC POWER circuit breakers (1) and DC POWER ON/OFF switches (2) OFF.
- (11) PS4 AND PS5 provides power to the MODEM/TDIM nest; PS6 AND PS7 provides power to the DLC/ILI nest.

NOTE: Show Slide D01-LP02-11, pg 2-49.

- (12) Next ensure that all-individual units and modules are shut OFF to include the VDT, LPU, COMSEC EQUIPMENT, DFDD and SDUs.

NOTE: Show Slide D01-LP02-12, pg 2-50.

- (13) Next, check that the intercom is off by rotating the send ON/OFF control knob fully counterclockwise.

NOTE: Show Slide D01-LP02-13, pg 2-50.

- (14) Shut off Environmental Control Units (ECU) by loosening captive screws and turn both mode select switches to the off position. Then set the circuit breakers to off.

- (15) This completes systems shutdown procedures. You are now ready to perform the start-up procedures.

- b. Perform start-up procedures for Message Switch

NOTE: Show Slide D01-LP02-14, pg 2-51.

- (1) Exit the shelter and check that the battery exhaust vent cover and personnel fan vent cover are open.

NOTE: Show Slide D01-LP02-15.

- (2) Next, move to the rear of the shelter and check the power entry panel connections. Raise the power entry panel cover. Check that power cable W3 connected to J1 (50/60 Hz). Check that the ECU power cables W2 are connected to J3 and J4.

1H 30M

NOTE: Show Slide D01-LP02-16, pg 2-52.

- (3) Now, turn on the external AC prime power source.

NOTE: Show Slide D01-LP02-17, pg 2-53.

- (4) Next, at the power control panel complete the following steps:
 - (a) Check that the EMERGENCY OFF switch is ON.
 - (b) Set the PHASE SELECT to A.
 - (c) Check that the AC voltage meter reads between 103 and 127 volts AC.
 - (d) Check that the AC current meter reads close to zero.
 - (e) Set the PHASE SELECT switch to B and repeat the check of voltage and current meter readings. Repeat this procedure with the switch in the C position.
 - (f) Check that the 50/60 Hz meter reads between 48 and 52 Hz for a 50 Hz source, or 58 and 62 Hz for a 60 Hz source.
 - (g) Set the main power circuit breaker on.
 - (h) Observe the BLACKOUT BYPASS indicator. This indicator should not be lit if you are in a blackout situation. Press the blackout bypass push-button on or off, according to the current situation.

2H

- (i) Set the main lights circuit breaker on.

NOTE: Show Slide D01-LP02-18, pg 2-54.

- (5) Next, set the regulator charger circuit breaker on. (Observe that the REGULATOR CHARGER indicator lights and the BUS voltage meter reads between 25 and 27 volts DC.)

NOTE: Show Slide D01-LP02-19, pg 2-56.

- (6) Next, turn on the shelter lights as follows:
 - (a) Shelter lights MAIN and EMERGENCY switches ON.
 - (b) Shelter lights MAIN ON/OFF switch to ON.
 - (c) Shelter lights EMERGENCY ON/OFF switch to ON.

NOTE: Explain to students to leave the EMERGENCY LIGHT switch on until the shelter temperature is high enough for the fluorescent lights to stay on.

- (d) Turn on the overhead fluorescent lights individually, as needed.
- (e) Turn shelter lights EMERGENCY ON/OFF switch to OFF. (See note)

NOTE: Show Slide D01-LP02-20, pg 2-57.

- (7) Next, exit shelter and close the port cover on the shelter door.

NOTE: Show Slide D01-LP02-21.

- (8) While outside the shelter, raise the power entry panel cover and set CB1/ECU1 and CB2/ECU2 circuit breakers on.

NOTE: Show Slide D01-LP02-22, pg 2-58.

- (9) Next, reenter shelter and turn on the ECUs (Failure to follow the ECU turn-on sequence will trip the circuit breakers inside the ECUs.)
 - (a) Set the compressor circuit breakers on.
 - (b) First, turn the MODE SELECTOR switches to the desired mode.
 - (c) Adjust the TEMPERATURE SELECTOR controls and evaporator fan speed for the required temperature conditions.
 - (d) Refasten the ECU panel cover using the five captive screws.

NOTE: Show Slide D01-LP02-24, pg 2-59.

- (10) Next, turn on the battery box circuit breakers.

2H 30M

- (a) Press circuit breaker CB11 on and check that battery bank 1 on the BUS indicator lights.
- (b) If the shelter has a second pair of batteries, press CB12 on and check that battery bank 2 on the BUS indicator lights.

NOTE: Show Slide D01-LP02-25, pg 2-60.

- (11) Your next step is to turn on the DC power.
 - (a) Check that the BATTERY EXHAUST FAULT indicator is not lit.
 - (b) Raise the switchguard to the DC ON-OFF push-button and depress it. (The indicator should light.)
 - (c) Check that the regulator charger on indicator is lit.

- (d) Next, turn the CURRENT SELECT switch to charge and check the flow charge meter for a reading of 8 AMPERE or less. If the meter reads above 8 AMPERE, charge the batteries and proceed with the start-up procedures.

NOTES: Refer students to TM 11-5805-790-12-1, para 2-26, page 2-66 for equalizing charge procedures.

NOTE: Show Slide D01-LP02-26, pg 2-61.

- (12) Next, turn on DC power to the individual units.

- (a) Set the DC CONTROL circuit breakers on.
- (b) Turn on all remaining DC circuit breakers.

- (13) Next, set the remaining AC POWER SUPPLY PS4/PS5 and PS6/PS7 circuit breakers on.

NOTE: Show Slide D01-LP02-27, pg 2-62.

- (14) Next, turn on DLC power circuit breakers.

NOTE: Show Slide D01-LP02-28, pg 2-64.

- (15) Turn on CPG power supplies by setting ON/OFF switch to ON.

NOTE: Show Slide D01-LP02-29, pg 2-64.

- (16) Turn on all power Processors DC and AC ON/OFF switches to ON.

NOTE: Show Slide D01-LP02-30, pg 2-64.

- (17) Next, at the power control panel, check the DC current meter for a reading of at least 25 AMPERES in each position.

NOTE: Show Slide D01-LP02-31.

3H

(18) Next, turn on intercom. Rotate the SEND ON/OFF switch and RECEIVE CONTROL knob clockwise 180 degrees.

(19) Next, turn on each individual MPS unit and module. (VDT, LPU, CEF, DFDD, and SDUs).

(a) Ensure that the contrast knobs are fully counterclockwise, then set the power ON/OFF switches on each VDT.

(b) Set the LPU POWER switches on.

(c) Set DFDD power ON/OFF switches ON.

(d) Set the SDU power switches on. Check that all power on indicators are lit.

(e) Set COMSEC circuit breakers and individual module power switches ON.

(20) At this time, start-up procedures for the MCS are completed.

NOTE: Refer students to TM 11-5810 series of COMSEC manuals for circuit breaker and switch locations.

QUESTIONS: When you check the DC current meter readings for each position of the current select switch. What reading would you expect?
(ANS: Current should read in each position at least 25 amperes.)

You are performing start-up procedures, in what position must the battery exhaust vent cover and personnel comfort fan vent cover be? (ANS: Open position.)

When you turn the regulator charger circuit breaker to ON, what should the bus voltage meter indicate? (ANS: Between 25 and 27 VDC.)

3. Demonstration - Power initialization procedures.

a. Perform system shutdown for the Message Control Shelter (MCS). (Step-by-step).

3H 30M

b. Perform sequential startup for the Message Control Shelter (MCS). (Step-by-step).

4. Practical exercise. During the practical exercise, observe the students on their ability to perform the learning objective; coach, if necessary. Have two students work together on equipment during the practical exercise. Rotate students by roster. Those students not working on the equipment will review all training material on power initialization.

a. Explanation to student.

(1) This is a two part practical exercise. In Part One, you will perform power initialization procedures. In Part Two, you will answer written questions about power initialization procedures.

(2) If it is not clear what you are required to do, ask your instructor for clarification.

(3) When you feel confident that you can, in Part One, correctly perform power initialization procedures within 25 minutes and In Part Two, correctly answer 7 of 10 written questions within 30 minutes, ask one of your instructors to evaluate your work.

(4) If you have no questions, you may start your practical exercise by reading and following the directions in your practical exercise sheet.

b. Application by students.

(1) In Part One, the student will perform power initialization procedures.

(2) In Part Two, the student will answer written questions about power initialization procedures.

(3) You will use your TMs to perform each individual step.

c. Evaluation. During Part One of this exercise, evaluate each student to ensure they have the ability to correctly perform power initialization procedures within 25 minutes. In Part Two, evaluate each student to ensure they can correctly answer 7 of 10 written questions within 30 minutes.

7H 55M

SUMMARY:

You have now completed your training program on power initialization procedures. During your future assignments, you will be called upon to perform power initialization procedures for the AN/TYC-39A as well as other required procedures. With the skills and knowledge learned during this training session, you will be successful in accomplishing this task.

8H

END

This document supports Task Number 113-603-3215.

ANSWER KEY FOR PRACTICAL EXERCISE 150-74G10/D01-LP02

1. A
2. A
3. DC ON/OFF
4. BATTERY BOX
5. PHASE SEQUENCE
6. A
7. POWER PROCESSOR FAILURE
POWER OFF
ENVIRONMENTAL CONTROL UNIT
POWER
POWER SUPPLY
8. LET TOXIC GASSES OUT
9. B
10. C

U.S. ARMY SIGNAL CENTER AND FORT GORDON
Fort Gordon, Georgia 30905-5180

LESSON PLAN

TITLE: AN/TYC-39A Power Group

LEARNING

OBJECTIVE: Action: The students will answer written questions and perform adjustments on the AN/TYC-39A power group.

Conditions: The student will be given TM 11-5805-790-12-1, TM 11-5805-790-34-3, AN/TYC-39A, tool kit, multimeter, and Practical Exercise 150-74G10/D01-LP03-PE.

Standard: Acceptable performance is achieved when the student can correctly answer 14 out of 20 questions within 1 hour and perform power supply adjustments.

SAFETY

CONSIDERATIONS: This lesson has safety hazards which may cause electrical shock or physical injury. Make sure students remove all jewelry and metal objects such as watches, rings, bracelets, and identification tags.

RISK

ASSESSMENT: A risk assessment has been conducted on this unit of instruction and the risk level is deemed to be: LOW RISK

RESOURCE

NEEDS/

REFERENCES: AN/TYC-39A, TM 11-5805-790-12-1, TM 11-5805-790-34-3, overhead projector, tool kit, multimeter, 150-74G10/D01-LP03-PE, and slides 1-16.

METHODS OF

INSTRUCTION: Conference, Practical Exercise.

TIME: 12 Hours

150-74G10\D01-LP03

1

APPROVAL DATE: 26 NOV 97

DEVELOPER: SFC CARTAGENA

DIV. CHIEF: Jack P. Rendon

NOTES TO INSTRUCTOR:

1. Ensure that the students are fully briefed on the dangers associated with the power group.
2. Ensure all training resources are available.
3. Ensure that equipment is operational before and after class.

NOTE: For the entire power group, refer and teach from TM 11-5805-790-12-1, Figure FO-2 Functional Diagram and TM 11-5805-790-34-3, Figure 6-2 Schematic Diagram. Explain power distribution by using these diagrams.

INTRODUCTION:

Elapsed Time 1. Almost everything manufactured, operated, or used in today's world requires electrical power. The AN/TYC-39A also requires electrical power for it to operate.

2. This lesson will focus on the AN/TYC-39A power group.

5M

BODY:

1. The dc/dc converter powers the L-3050V processors.

NOTE: Show Slide D01-LP03-SLIDE-1.

- a. There are two converters, one for each processor.
 - (1) PS14 is found on the left and powers CPU #1.
 - (2) PS15 is found on the right and powers CPU #2.
 - (3) The dc/dc converters are non-redundant but they are interchangeable.
- b. As we view this diagram of the converter, we can see the components visible to the maintenance person from the front panel.
 - (1) Cooling fan provides power supply cooling.

(2) Voltage Test Points.

- (a) P1 +5-Vdc test point (RED).
- (b) P2 +5-Vdc test point (RED).
- (c) Monitor +5-Vdc test point (RED).
- (d) Return +5-Vdc test point (GRAY).

- (3) Fault indicator (RED) indicates fault condition of the power supply.
- (4) +5-Vdc adjust provides power supply adjustments.
- (5) There is a lock nut that secures the +5VDC adjust.
- (6) Power ON/OFF switch controls the output power of the converter.

c. The dc/dc Converter Block Diagram.

NOTE: Show Slide D01-LP03-SLIDE-2.

- (1) Input voltage is 21-30 Vdc through input connectors P1 and P2 to EMI filter, and is supplied to the dc/dc converter via the 26.5 VDC bus.
- (2) The EMI prevents electromagnetic interference on the dc lines from reaching the regulated output voltage.
- (3) CR1 is used to protect the converter if a reverse inverse voltage is applied by shorting the input power bus.
- (4) Input voltage activates the blower, which provides power supply cooling.
- (5) Input power is controlled by the front panel ON/OFF switch.
 - (a) When closed, it activates control circuits to initiate operation.
 - (b) In the OFF position, the front panel fault light activates automatically. It indicates a low-voltage condition.
- (6) The heart of the power supply is a 20-kHz pulse-width modulated dc/dc converter with transformer isolation between input and output.
 - (a) Output is +5 Vdc 0-75 Amps.

20M

- (b) CPU draws approximately 20 Amps.
- d. The power supply consists of both regulation circuits and fault circuits.
 - (1) Regulation circuitry compensates for changes in output voltage via sense lines, which regulate voltage according to the fluctuation in the output voltage.
 - (2) Power supply fault circuits include both undervoltage and overvoltage detection.
 - (a) If the output voltage is below 4.5 Vdc, the fault circuits detect the decrease and activate the front panel fault indicator.
 - (b) If the output voltage increases to 6.25 Vdc, the power supply turns off automatically, resulting in an undervoltage condition, which is indicated by the illumination of the fault indicator on the front panel.
- e. CPU Power Diagram.

NOTES: Show Slide D01-LP03-SLIDE-3.

Additional information on the CPU power system may be found in TM-11-5805-790-34-3 (Schematic Diagram AN/TYC-39A POWER, Sheet 6).

- (1) L-3050V Power Input.
 - (a) The 26.5 Vdc W2 Bus feeds power to CB24 (CPU 1) and CB25 (CPU 2).
 - (b) 26.5 Vdc is then applied to E42 assembly via TB9.
 - (c) PS14 and PS15 then convert 26.5 Vdc into 5.1 Vdc for use by CPU 1 and CPU 2.
- (2) CPU Blower Assembly Power Input.
 - (a) The 26.5 Vdc W2 Bus feeds power to TB1 pin 2 of A37 Blower Fuse

Assembly and into F1 (CPU 1 Blower) and F2 (CPU 2 Blower).

(b) From F1 and F2, 26.5 Vdc returns to TB1 pins 3 and 4 to be routed over to A36 Blower Assembly.

(c) Power enters A36 Blower Assembly at J1 and is fed to CPU blowers 1 and 2.

40M

2. Power Processor.

NOTE: Show Slide D01-LP03-SLIDE-4.

a. Provides ± 5 and ± 15 V to the following equipment.

- (1) Modem/TDIGM
- (2) DLTM/CICU
- (3) CAP/Controller
- (4) DLC/ILI

b. Power processors PS4 and PS5 are found under the modem/TDIGM nest.

- (1) They are redundant.
- (2) Power processors PS4 and PS5 provide power to the modem/TDIGM.

c. Power processors PS6 and PS7 are found under the DLTM/CICU nest.

- (1) They are redundant.
- (2) They power the DLC/ILI nest.
- (3) They also power the CAP/control nest.

d. Power processors provide the secondary sources of dc power for those loads which require dc voltages other than that supplied by the W2 bus.

e. They have two input capabilities.

- (1) 115/200 Vac at 50, 60, or 400 Hz
- (2) 26.5 Vdc

f. The input circuitry of the power processors is such that a precedence technique is employed in the selection of input voltage.

1H

- (1) The precedence is such that the prime ac voltage, when present in the shelter, is employed in powering the power processors.
- (2) In the absence of prime ac power, or during degradation of this input source, the power processors automatically switch to the 26.5-Vdc main bus (battery provided) without degradation of the regulated output voltages.

g. Panel Description

NOTE: Refer students to TM-11-5805-790-12.

- (1) Controls/Indicators
- (2) Test Points
- (3) Adjustments

h. Power Processor Simplified Block Diagram -
The power processor consists of four sections.

NOTE: Show Slide D01-LP03-SLIDE-5.

- (1) Input Select - Selects ac input if there is an ac source. If no ac source is present, then the dc input is selected.
- (2) AC/DC Converter Section - Converts 115 Vac to 26.5 Vdc for the dc/dc converter
- (3) DC/dc converter takes 26.5 Vdc and converts it to the output voltages that are needed.
 - (a) ± 15 V.
 - (b) ± 5 V.
- (4) Output Section - Rectifies and filters the output voltage from the dc/dc converter, and sends to the following:
 - (a) TDIGM/modem nest.
 - (b) Controller nest.
 - (c) DLC/ILI nest.

3. 12-V Regulator Module.

NOTE: Show Slide D01-LP03-SLIDE-6.

- a. The 12-V regulator receives four input voltages from the power processor.
 - (1) +5 Vdc.
 - (2) -5 Vdc.
 - (3) +15 Vdc.
 - (4) -15 Vdc.
- b. The 12-V regulator provides three output voltages.
 - (1) +12 Vdc.
 - (2) -12 Vdc.
 - (3) -10 Vdc.
- c. The 12-V regulator provides the necessary operating voltages for the following nest assemblies.
 - (1) Modem/TDIGM nest.
 - (2) DLC/ILI nest.
- d. There are test points that may be used to check the input or output voltages.
 - (1) TP23 for -10 V output.
 - (2) TP24 for -12 V output.
 - (3) TP20 for +12 V output.
 - (4) TP25 for -15 V output.
 - (5) TP21 for +15 V input.
 - (6) TP22 for -5 V input.
 - (7) TP19 for +5 V input.
 - (8) TP26 for ground.

4. DLC Power.

NOTES: Show Slide D01-LP03-SLIDE-7.

Additional information on the ILI/DLC/Controller power system may be found in TM-11-5805-790-34-3 (Schematic Diagram AN/TYC-39A POWER, Sheet 8).

- a. There are circuit breakers dedicated to each DLC.
 - (1) CB1 is for DLCA (located above DLCA).
 - (2) CB2 is for DLCB (located above DLCB).

- b. A DLC circuit breaker should not be turned off when the other DLC is in use.
- c. CB1 and CB2 receive inputs of +5, +12, and -12 Vdc and are powered by the ILI nest.
- d. The ILI nest and the controller nest both receive the standard output (+5, -5, +15, and -15 Vdc) from Power Processors 6 and 7.
- e. CB48 is a three-phase 118 Vac circuit breaker that feeds PS6 and PS7.
- f. CB35 is a 26.5 Vdc circuit breaker that feeds PS6 and PS7.

NOTE: Recapitulate key points. Ask questions to ensure student understanding of material covered.

2H

- 5. Power Distribution - Up to this point, we have discussed the power system subassemblies. Now we are going to examine the power distribution.

- a. Power Entry Panel (PEP).

NOTE: Show Slide D01-LP03-SLIDE-8.

- (1) Each shelter contains a PEP. The PEP accommodates the prime ac input power. There are two prime power connectors:
 - (a) J1 INPUT, which is used for 115/200 Vac 50/60 Hz
 - (b) J2 INPUT, which is used for 115/200 Vac 400 Hz
- (2) Only one connector is wired for each shelter, and the connectors are keyed so that mixing the wrong frequency with the wrong shelter is difficult.
- (3) Connectors J3 and J4 are used for connecting the ECU power cables. J3 is for ECU1, and J4 is used for ECU2.
- (4) Above the connectors are two CBs. These CBs provide power and protection to the ECUs.

(5) Ground stud E1 is used to the connector for the PEP ground strap.

b. Each 115-Vac phase and neutral contains a Metal Oxide Varistor (MOV).

NOTE: Show Slide D01-LP03-SLIDE-9.

- (1) This MOV is located inside the shelter wall.
- (2) The MOV suppresses line transients on each of the three input phases and the neutral line of the prime ac power up to 2000 V.
- (3) If the input voltage exceeds 2000 V, either negative or positive, then the MOV becomes disconnected from the line shelter and connected to ground.

c. Electromagnetic Interference (EMI) Filter

NOTE: Show Slide D01-LP03-SLIDE-10

Each phase of the input prime power, including neutral line, is protected by the EMI filter. The EMI filter is installed in series with the PEP and the power control panel. The purpose of the EMI is two-fold.

- (a) To prevent noise generated within the shelter from interfering with equipment using the same power source.
- (b) To eliminate emissions generated within the shelter from appearing external to the shelter.

2H 30M

d. Power Control Panel.

NOTE: Show Slide D01-LP03-SLIDE-11.

- (1) CONTROL AC and CONTROL DC circuit breakers provide individual control for each phase of ac input and dc output from the regulator charger.

- (2) EMERGENCY OFF toggle switch provides emergency shutoff to all power in the shelter.
- (3) Audible alarm contains TEST button and alarm and visual indicator.
- (4) AC Section of Power Control Panel
 - (a) Phase rotation detector monitors each phase of prime ac input to ensure that the correct phase rotation exists.
Detection of an incorrect phase relationship or loss of one or more phases causes the following.
 - 1. The main CB(3) is not allowed to maintain the ON condition.
 - 2. An audible and visual phase sequence alarm is activated.
 - (b) MAIN POWER circuit breaker provides prime ac input power to the shelter and will trip if one or more input phases are faulty.
 - (c) The ac voltmeter is switchable to monitor each input phase.
 - (d) The ac ammeter is switchable to monitor each input phase.
 - (e) Frequency meters are resonant read-type meters which measure input ac frequency per phase and are switchable to monitor each input phase.
 - (f) Meter selector switch allows connection of the ammeter, voltmeter, and frequency meter to any of the three prime ac inputs without an interruption of power.
 - (g) Phase fault alarm indicates that the incoming power is not in phase.
 - (h) PHASE FAULT indicator indicates that the incoming power is not in phase.
 - (i) Proper phase indicator lamp indicates that the incoming power is in phase.
 - (j) MAIN LIGHTS CB applies voltage to the shelter lights.

3H

- (k) BLACKOUT BYPASS is used to keep lights on while the door is opened.
- (l) REGULATOR/CHARGER ON indicator indicates that the charger is on.

(5) DC Section of Power Control Panel.

- (a) EMERGENCY POWER indicator indicates when the system is operating from the battery bank.
- (b) FLOAT CHARGE meter indicates the charge level of the battery bank.
- (c) The dc voltmeter monitors the 26.5-Vdc bus.
- (d) the dc ammeter is a switchable meter that can monitor load current or regulator/battery charger current.
- (e) ELAPSED TIME meter is active upon power turn-on. It is provided to record the elapsed time of power subsystem usage. It has a four-digit readout to the nearest tenth of an hour.
- (f) BATTERY EXHAUST FAULT indicator indicates if battery exhaust port is closed.
- (g) The DC ON-OFF indicator indicates whether 26.5 Vdc is available.
- (h) Low Voltage Detector - When the bus voltage drops to 21.5 Vdc (as a result of battery end-of-discharge cycle), all dc loads, with the exception of the emergency lights, are automatically disconnected from the dc bus.
- (i) DC CONTROL circuit breaker, when activated, enables individual load circuit breakers that control the dc loads.
- (j) BATTERY BANK indicators
- (k) DC ON/OFF switch enables or disables all of the dc loads.

3H 15M

e. Block Diagram Analysis (AC Section).

NOTE: Show Slide D01-LP03-SLIDE-12.

- (1) Incoming, 3-phase Primary Power.
- (2) Phase Monitoring and Alarm Circuitry.
 - (a) Phase rotation detector.
 - (b) 24 V power supply.
 - (c) Proper phase indicator.
 - (d) Phase fault indicator.
 - (e) Audible phase alarm.
 - (f) If rotation detector detects power not in phase, you will not be able to turn main power circuit breaker ON.
- (3) Frequency Meters.
 - (a) 50/60 Hz meter.
 - (b) 400 Hz meter.
- (4) Main Power Breaker.
- (5) AC Power to Breakers.
 - (a) Regulator/charger breaker.
 - (b) Utility breaker.
 - (c) Light breaker.
 - (d) Power processor breakers.
- (6) EMERGENCY Power Switch.
 - (a) Trips MAIN POWER Circuit Breaker.
 - (b) Trips DC CONTROL Circuit Breaker.
- (7) REGULATOR CHARGER ON Indicator.
- (8) BLACKOUT BYPASS Switch/Indicator.
- (9) Meter select switch is the phase select switch A, B, C. This switch indicates what the voltage and current is for each phase.

3H 45M

f. Block Diagram Analysis (DC Section).

NOTE: Show Slide D01-LP03-SLIDE-13.

- (1) AC input to regulator charger is 3-phase ac.
- (2) Regulator charger output to dc bus through a circuit breaker.

- (3) Battery bank output to dc bus is used in case the regulator charge does not put out enough dc volts.
- (4) EMERGENCY power indicator indicates that the shelter is running off the battery.
- (5) EQUALIZING CHARGE indicator indicates that the battery is in the recharging mode.
- (6) DC ON indicator indicates that there is dc voltage on the bus.
- (7) DC BUS VOLTAGE meter measures the voltage on the bus.
- (8) Output to dc Load - 26.5 V is sent to all the equipment that need dc voltage circuit breakers.
- (9) DC ON/OFF switch allows control voltage to the DC CONTROL circuit breaker.
- (10) Low voltage detector detects low voltage, which stops the DC ON/OFF switch from going on.
- (11) DC CONTROL circuit breaker puts 26.5 Vdc on the W2 bus and voltage to the dc/dc converters and power processors.
- (12) Output to dc Loads - 26.5 V is sent out to the dc loads.
- (13) Outputs to dc/dc converters and power processors.
- (14) CURRENT Meter SELECT switch measures battery charger current or the dc bus.
- (15) CURRENT meter indicates what the output current is on the dc bus or the regulator charger.

g. Power Distribution Panel.

NOTE: Show Slide D01-LP03-SLIDE-14

This circuit breaker panel controls the application of power to the individual AN/TYC-39A equipment groups. The power distribution panel is divided into two sections, ac power distribution and dc power distribution.

- (a) AC Power Distribution - This section of the power distribution panel controls the application of ac power to direct ac loads and to the AN/TYC-39A power processors which receive both ac and dc power.

1. SHELTER LIGHTS.

- a. MAIN lights switch.
- b. EMERGENCY lights switch.

2. REGULATOR CHARGER breaker applies 3-phase, 115 Vac 50/60 or 400 Hz to the regulator charger.

3. UTILITY applies single-phase, 115 Vac 50/60 or 500 Hz to the utility outlets on this panel.

4. POWER SUPPLY applies 3-phase, 115 Vac 50/60 or 400 Hz to PS4 through PS7. P

- a. PS4/PS5 circuit breaker applies 3-phase, 115 V ac to the modem/TDIGM power processor.

- b. PS6/PS7 circuit breaker applies 3-phase 115 V ac to the DLC/ILI and CAP controller power processor.

4H 15M

- (b) DC Power Distribution - This section controls the application of 26.5 Vdc power to direct dc loads, dc-to-dc converters, dc-to-ac inverters, and to power processors.

1. LP circuit breakers A and B apply +26.5 Vdc to Line Printer A and Line Printer B. They both are a direct load.

2. SDS1 through SDS3 circuit breakers apply 26.5 Vdc to SDS1 through SDS3. They are a direct dc load.
3. TRI-TAC COMSEC circuit breakers 1 and 2 provide 26.5 to the COMSEC equipment. They all are a direct load.
4. DSVT circuit breaker provides +26.5 Vdc to the message switch DSVT. This is a direct load.
5. DFDD circuit breaker provides 26.5 Vdc to the FDDs. They both are direct load.
6. VDT circuit breakers A, B, and C provide 26.5 to the VDTs. They all are direct loads.
7. CPU1 and CPU2 circuit breakers apply 26.5 Vdc to the dc/dc converters associated with CPUs 1 and 2.
8. INTERCOM circuit breaker provide +26.5 Vdc to the dc/ac inverter associated with the intercom.
9. POWER
SUPPLY circuit breakers PS4 through PS7 apply 26.5 Vdc to the power processors associated with the modem/TDIGM nest, the DLC/ILI nest, and the CAP/controller nest.

10. The 26.5
Vdc is backup or emergency power for these power processors.

4H 45M

h. AN/TYC-39A Overall Power Flow.

NOTE: Show Slide D01-LP03-SLIDE-15.

(1) AC Power Flow.

- (a) Prime power in via power entry panel: 3-phase, 115 Vac, 50/60 Hz or 400 Hz.
- (b) 115 Vac to the ECUs use three phases.

- (c) Prime Power to the ac/dc power control panel.
- (d) Prime Power to the regulator charger uses three phases.
- (e) 3-phase 115 Vac to the power distribution panel.
- (f) 115 Vac to Non-Critical ac Loads.

- 1. Utility Outlets use single-phase 115 Vac (phase C).
- 2. Shelter lights use single-phase 115 Vac (phase A).
- 3. Battery Box Fan uses single-phase 115 Vac (phase C).
- 4. COMSEC fans use single-phase 115 Vac (phase B).

- (g) 115 Vac to Critical ac Loads.

- 1. Modem/TDIGM Power Processors: Redundant power processors PS4 and PS5 located under the TDIGM/modem rack; one is on-line, the other is hot standby.

- 2. LC/ILI and CAP/Controller Power Processors: Redundant power processors PS6 and PS7 located under the DLC/ILI nest; one is on-line, the other is hot standby. D

- 3. The power processors use all three phases.

5H 15M

(2) DC Power Flow.

- (a) 26.5 Vdc from regulator charger to ac/dc power control panel dc bus. When primary power is lost, input

to the dc bus is from the battery banks, emergency power.

- (b) Dc bus feeds 26.5 Vdc to the power distribution panel.
- (c) 26.5 Vdc to Power Processors/Converters.

1. Modem/TDIGM Power Processors provide emergency power to redundant power processors PS4 and PS5.
2. DLC/ILI and CAP/Controller Power Processors provide emergency power to redundant power processors PS6 and PS7.
3. DC/AC inverter for intercoms provides 120 Vac to the intercoms under normal and emergency power conditions.
4. DC/DC Converters for CPU 1 and 2: Two dc/dc converters in the CPG cabinet. Not redundant equipment; each dc/dc converter is dedicated to one CPU.

- (d) +26.5 to Direct dc Loads.

1. Storage Device System (SDS).
2. Visual Display Terminals (VDTs).
3. Digital Subscriber Voice Terminal (DSVT).
4. COMSEC Equipment.
5. Floppy Disk Drives (FDDs).
6. Equipment Fans.
7. Line Printer Units (LPUs).
8. Comfort Fan.

NOTE: Recapitulate key points. Ask questions to ensure student understanding of material covered.

6. Power System Adjustments.

NOTES: Show Slide D01-LP03-SLIDE-16.

Refer students to TM-11-5805-790-12, and discuss the following adjustment procedures.

- a. Regulator/Battery Charger.
- b. Power Processor.
- c. DC/DC Converter.
- d. DC Trip Voltage.
- e. 12 V Regulator.

NOTE: Recapitulate key points. Ask questions to ensure student understanding of material covered.

7. Power System Schematic.

NOTES: Go over the AN/TYC-39A power system schematic in TM-11-5805-790-34-3 (sheets 1-12).

It is important that the students have a working knowledge of this schematic. Refer students to first page of card schematic on most cards for power pins. All GTE cards power is on all the same pins. All DLC cards power is on all the same pins. Use TM 11-5805-790-34-3 page 6-72 and 6-74 to explain power input pins.

7H

8. Practical exercise.

- a. Explanation to students.
 - (1) You must answer 14 out of 20 questions on the practical exercise by filling in the blank or circle the correct answer on the multiple-choice questions.
 - (2) When you are finished with the practical exercise, have your instructor grade it for you.
 - (3) If what you are required to do is not clear, ask your instructor for clarification.

- b. Application by students. You must answer 14 out of 20 questions on the AN/TYC-39A power group within 1 hour.
- c. Evaluation. During this practical exercise evaluate each student to ensure they can correctly answer at least 14 out of 20 questions pertaining to the power group within 60 minutes.

11H 55M

SUMMARY:

In this lesson, we discussed the AN/TYC-39A Power System, its subassemblies, and its maintenance and fault isolation. The performance exercise portion of this lesson will enable you to apply this information while practicing these procedures in a hands-on training environment.

12H

END

This document supports Task Number 113-603-3215

ASSIGNMENT SHEET D01-LP03-PE
AN/TYC-39A power SUPPLY

1. What terminal on the L-3050V is used for dc return? (TM 11-5805-790-34-3, Fig 6-2, Pg 6-9, middle right) Terminal E1
2. What pin of what terminal board is between PS5 and the dc input for PS5?

Terminal Board 9 Pin 1
3. What plug and what pin is used for input power to VDTB?

Plug 29 pin A
4. What plug and what pin is used for input power to SDS2?

Plug 11 pin B
5. What plug and what pin is used for input power to the A63 Blower?

Plug 52 pin A
6. What plug and what pin is used for input power to LPUB?

Plug 33 pin A, B, C
7. What pin of what jack is used for phase B output to ECU2?

Pin B Jack 4
8. What circuit breaker turns on the battery box fan?

Circuit Breaker 5, Regulator Charger
9. What pin of Terminal Board 1 of E42 Assembly provides +15 Vdc to the controller nest?

Pin 13
10. What pins on CB1 of A25 DLC/ILI Nest carry -12 Vdc to the multibus?

Pins 8 and 9
11. What is the maximum current for the circuit breaker that provides power to SDS3?

10 Amps

12. What plug and what pin is used for ac input power to the HGF-83?

Plug 57 pin A

13. How does the Modem/TDIGM nest get its +12 Vdc?

+12VDC is generated from within the nest on 12V regulator cards.

14. What is TB1 of E41 assembly used for?

To connect AC input power

15. What type of power is found on pins 3 and 4 of Terminal Board 1 inside of PS30 (used for intercom)?

AC power

16. What plug and what pin is used for dc return of FDDA?

Plug 9 pin C

17. Where does 5 Vdc connect to the controller nest?

W1 pin 2 and W6 pin 2

18. What plug and what pin is used for -15 Vdc output of PS5?

Plug 4 pin 4

19. How does the DLC nest (A and B) multibus get its 12 Vdc? Explain.

+12VDC is generated from within the ILI nest on 12V regulator cards and applied to the multibus via circuit breakers CB1 and CB2 of the DLC/ILI nest.

20. In the power entry panel, what jack and what pin is used for phase C input?

Jack 1 pin C

U.S. ARMY SIGNAL CENTER AND FORT GORDON
Fort Gordon, Georgia 30905-5180

LESSON PLAN

TITLE: AN/TYC-39 Power Group Fault Isolation and Repair

LEARNING

OBJECTIVE: Action: In Part One, the students will perform power group fault isolation and repair. In Part Two, students will answer questions about power group fault isolation procedures.

Conditions: The student will be given the AN/TYC-39A; TM 11-5805-790-12-4, TM 11-5805-790-12-6, TM 11-5805-790-12-7, TM 11-5805-790-12-8, Tool Kit, a digital multimeter; and Practical Exercise, 150-74G10/D01-LP04-PE.

Standard: In Part One, acceptable performance is achieved when the students can correct given faults by using the fault isolation flowcharts within 90 minutes. In Part Two, acceptable performance is achieved when the student correctly answers 7 out of 10 questions within 30 minutes.

SAFETY

CONSIDERATIONS: This lesson has safety hazards which may cause electrical shock or physical injury. Make sure students remove all jewelry and metal objects such as watches, rings, bracelets, and identification tags.

RISK

ASSESSMENT: LOW.

RESOURCE

NEEDS/

REFERENCES: AN/TYC-39A, TM 11-5805-790-12-4, TM 11-5805-790-12-6, TM 11-5805-790-12-7, TM 11-5805-790-12-8, digital multimeter, Tool Kit, overhead projector, practical exercise 150-74G10/D01-LP04-PE and slides 1-2.

METHODS OF

INSTRUCTION: Conference, Practical Exercise.

TIME: 9 Hours

NOTES TO INSTRUCTOR:

1. Have all training resources available for use.
2. Emphasize extreme caution during the practical exercise.
3. Ensure equipment is operational at all times.

INTRODUCTION:

- Elapsed Time
1. In the last lesson you learned about the AN/TYC-39A power group.
 2. This lesson will focus on the fault isolation and repair of the power group. You will interpret maintenance operational printouts from the line printer unit (LPU) and video display unit (VDU); use the fault isolation flowchart to isolate the faults; and remove and replace the faulted components of the power group.
 3. Let us begin our lesson by studying the maintenance operational printout indicating a fault in the power group.

3M

BODY:

1. Maintenance operational printout.
 - a. Operational printouts provide information relating to:
 - (1) Operational status of system/subsystem/peripherals.

(2) Errors and faults.

- (3) Actions to be taken/responses made.
- (4) Pass/failure of self-checks.
- (5) Change of equipment function.
- (6) Results of an operation.
- (7) Responses to operator's input.

b. Shelter status operational printout.

- (1) This printout occurs when the shelter status changes or when the CAP reports a shelter alarm.

NOTE: Show Slide 1 and explain. Refer students to TM 11-5805-790-12-4, paragraph 5-46b.

- (a) Not all the status conditions (AIR, BAT, etc.) will appear in every printout. Only the status conditions with a problem will appear in the printout.
- (b) The printout appears at the LPU and VDT.
- (c) Any number of these alarms may be present at the same time.
- (d) The AIR, BAT, DCP, HOT, PPF, and OPN alarms will produce a maintenance operational printout.
- (e) These alarms light the SUMMARY FAULT indicator on the CAP.

(2) Definition of alarms.

- (a) AIR - loss of shelter air flow.
 - (b) BAT - shelter on battery.
 - (c) DCP - DC power failure.
 - (d) HOT - high temperature.
 - (e) PPF - power processor failure.
 - (f) OPN - shelter door open.
- (3) Some failures cause the audible alarm on the CAP or on the power control panel to sound. Shut off the alarm before starting fault isolation.

QUESTION: If a printout appears reading "DCP", what would be the indicated fault? (ANS: DC power failure.)

20M

2. Power subsystem fault isolation flowchart.

NOTES: Refer students to TM 11-5805-790-12-8, para 11-3, pg 11-18. Have the students examine the flowchart. Explain to them that the technique for following the flowchart, answering the questions, and ultimately isolating and repairing the faults are the same as in system fault isolation procedures.

Use the following example to illustrate: If a "BAT" alarm displayed on the VDT and printed on the LP, connector 2A would be followed to isolate the indicated fault.

Explain to students that the flowchart assumes an ONLINE power failure. Startup power problems are considered a "BAT" alarm with "Loss of prime AC power; on battery".

QUESTION: If an "AIR" alarm displayed on the VDT and printed on the LP, which connector would you follow to isolate the indicated fault? (ANS: 15A.)

25M

3. Removal and replacement of power group components.

NOTES: Refer students to TM 11-5805-683-12-7. Explain to the students that there are many different removal and replacement procedures related to the power group in this TM. Because of the vast number, time will not be spent covering all of them. Every example for removing and replacing a power group component is verbally and graphically explained in detail.

Use the following example and reference to illustrate: TM 11-5805-790-12-7, paragraph 10-58. If by following the flowchart, you find that the Power Processor needs

replacement, the TM gives step-by-step instructions on how to perform the task. During the practical exercise, the student may be assisted by the instructor in explaining the specifics of a particular procedure.

QUESTION: Which TM and paragraph illustrates the removal and replacement of circuit breaker CB13? (ANS: TM 11-5805-790-12-7, paragraph 10-41)

30M

4. Practical exercise.

a. Explanation to students. This is a two-part practical exercise.

- (1) Part One. Uses the AN/TYC-39A; TM 11-5805-790-12-4, TM 11-5805-790-12-6, TM 11-5805-790-12-7, TM 11-5805-790-12-8; digital multimeter; and Practical Exercise, 150-74G10/C02-LP04-PE to isolate and repair faults in the power group within 90 minutes.
- (2) Part Two. You must correctly answer 7 out of 10 written questions pertaining to power group fault isolation and repair within 30 minutes.
- (3) Perform the procedures that are directed and have your instructor evaluate you as you perform each step.
- (4) Remember to be extremely cautious as you handle the components of the power group. High voltages are present in this equipment.
- (5) When you are finished with the practical exercise, have your instructor grade it for you.
- (6) If what you are required to do is not clear, ask your instructor for clarification.

b. Application by students.

- (1) Part One. Using the AN/TYC-39A; TM 11-5805-790-12-4, TM 11-5805-790-12-6, TM

11-5805-790-12-7, TM 11-5805-790-12-8;
digital multimeter, and Practical
Exercise, 150-74G10/C02-LP04-PE the
students will isolate and repair faults
in the power group.

(2) Part Two. The students will answer
written questions pertaining to power
group fault isolation and repair.

c. Evaluation. During Part One of this
practical exercise, evaluate each student to
ensure they have the ability to use the fault
isolation flowcharts to isolate and repair
faults in the power group within 90 minutes.

In Part Two, evaluate each student to ensure
they can correctly answer at least 7 out of
10 questions pertaining to power group fault
isolation and repair within 30 minutes.

8H 57M

SUMMARY:

During this lesson, you learned to use the
maintenance operational printout, power group
fault isolation flowchart, and the procedures for
removal and replacement of power group components.
In an actual field environment these skills will
be applied often. Other areas of the message
switch will be either directly or indirectly
related to the components of the power group. In
the next lesson, you will learn TYC-39A System
Initialization.

9H

END

This document supports Task Number 113-603-3215.

AN/TYC-39 POWER GROUP FAULT ISOLATION AND REPAIR

PRACTICAL EXERCISE ANSWER KEY

PART ONE:

NOTE: Malfunction 1 : Remove K1- Relay

- 1a. MAIN POWER circuit breaker will not stay on when performing power initialization.
- 1b. 2A
- 1c. K-1 relay. Reconnect.
- 1d. TM 11-5805-790-12-8, para 11-3; TM 11-5805-790-12-7, para 10-39 (k, l) page 10-134 .

NOTE: Malfunction 2- Turn CB13 off

- 2a. DC CONTROL circuit breaker will not stay on.
- 2b. 3A
- 2c. CB13 not on. Reset CB13.
- 2d. TM 11-5805-790-12-8, para 11-3 page 11-21; TM 11-5805-790-12-7, para 10-41 page 10-153.

NOTE: Malfunction 3 -

- 3a. PPF printout.
- 3b. 10A
- 3c. CAPA card (A16A113). Reseated card.
- 3d. TM 11-5805-790-12-8, para 11-3, page 11-28; TM 11-5805-790-12-7, para 10-11, page 10-22.

NOTE: If time permits insert more malfunctions for practice.
PART TWO:

All the references for these questions are taken from TM 11-5805-790-12-8, para 11-3.

Question/Answer	Reference
1. c	Page 11-18
2. d	11-18
3. b	11-18
4. b	11-19
5. a	11-29
6. c	11-20
7. a	11-21
8. a	11-26
9. d	11-33
10. c	11-25

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LESSON PLAN

TITLE: Processor Start-Up Procedures AN/TYC-39A

LEARNING

OBJECTIVE: Action: In Part One, the student will perform single and dual processor start-up. In Part Two, the student will correctly answer 14 out of 20 questions on processor start-up procedures.

Conditions: The student will be given an operational AN/TYC-39A; TM 11-5805-790-12-1, TM 11-5805 790-12-3, TM 11-5805-790-12-5; and practical exercise 150-74G10/D01-LP10-PE.

Standards: In Part One, acceptable performance is achieved when the student correctly performs single and dual processor start-up within 30 minutes. In Part Two, acceptable performance is achieved when the student correctly answers 14 out of 20 questions on processor start up in 1 hour.

SAFETY

CONSIDERATIONS: There are no safety considerations for this lesson.

RISK

ASSESSMENT: LOW.

METHODS OF

INSTRUCTION: Conference, Practical Exercise

TIME: 20 Hours

RESOURCES

NEEDS/

REFERENCES: Operational AN/TYC-39A; TM 11-5805 790-12-1, TM 11-5805-790-12-3, TM 11-5805-790-12-5; Practical Exercise, 150-74G10/D01-LP10-PE; Overhead Projector, and Slides 1-10.

NOTES TO INSTRUCTOR:

1. Ensure all training resources are available.
2. Ensure all safety procedures and practices are followed.
3. Ensure all equipment is operational.
4. Evaluate students on their ability to perform the learning objective during the practical exercise.
5. At the end of the class, ensure all equipment is operational.

INTRODUCTION:

- | | |
|-----------------|---|
| Elapsed
Time | <ol style="list-style-type: none">1. As an operator/maintainer it is important that you know how to perform all the procedures that are required prior to performing AN/TYC-39A processor start-up procedures.2. This lesson will teach you the skills, knowledge, and procedures necessary for you to accomplish the task of performing AN/TYC-39A processor start-up procedures. You will practice until you have demonstrated the ability to correctly perform single and dual processor start-up procedures within 30 minutes (Part One). In Part Two, you will correctly answer 14 out of 20 questions on processor start-up procedures within 1 hour.3. Let's begin our study by briefly discussing the processor start-up procedures that are used with the message switch AN/TYC-39A. |
|-----------------|---|

3M

BODY:

1. Equipment required to initialize system.

- a. Floppy disk drive (FDD) - The FDD is the only means of loading the program literary disk (PLD) bootstrap.

Normally PLD disk 1 goes in A and PLD disk 2 goes in B.

- b. Storage device units (SDUs). There must be at least three SDUs.

- (1) Control SDU.
- (2) History 1.
- (3) History 2.

NOTE: Explain to the students that in normal configuration there are six SDUs: SDU A is a CONTROL; SDU B is a HISTORY 1; SDU C is a HISTORY 2; SDU D is a REDUNDANT CONTROL; SDU E is a HISTORY 1; SDU F is a HISTORY 2.

- c. Video display terminal (VDT) - There must be at least one VDT. Normal configuration:

- (1) VDU A is the supervisory position.
- (2) VDU B is the traffic service position.
- (3) VDU C is the maintenance position.

- d. Line printer unit (LPU) - There must be at least one printer connected to the on-line processor at all times. Normal configuration:

- (1) LPU A is connected to the supervisory VDT.
- (2) LPU B is connected to the traffic service VDT but may be used with the maintenance position.

30M

2. Single processor start-up procedure.

NOTES: Explain to students that this procedure is used for normal startup of the on-line or standby processor, using PLD initialized by the SSO. (This procedure will be taught in another lesson for initializing PLD procedures).

- a. Install PLD disk.

NOTES: For detailed write protection and installation instructions, refer to FDD operating procedures in paragraph 2-31.

Show Slide 1.

Refer students to TM 11-5805-790-12-1, para 2-27, page 2-69.

- (1) Write protect and insert PLDB1 into FDD DR A.
- (2) Close FDD DR A door.

b. Load bootstrap program.

NOTES: Show Slides 2.

Refer students to TM 11-5805-790-12-1, para 2-27, page 2-70.

- (1) On status and control panel of CPU which is to be started, set PROGRAM TEST thumbwheel switches (1 and 2) to octal device address of FDD where PLD is mounted (10 for FDD A, 11 for FDD B).

NOTE: Show Slides 3.

- (2) On control and alarm panel (CAP), set PERIPHERALS switch to processor to be on-line, PROC 1/PROC 2.
- (3) Press INITIATE pushbutton (once).
- (4) On central processing unit (CPU), press RESTART pushbutton.

NOTE: The next two steps must be performed within a limited time period.

- (5) On CAP press PROGRAM LOAD pushbutton (twice).
- (6) The central processing group (CPG) then begins to run a diagnostic test which takes several minutes. The diagnose status display reads a series of numbers ranging from 777777 to 000000.

NOTE: Point out to the students that they can check for the busy light on the FDD to ensure that the processor is communicating with the FDD.

QUESTIONS: How many times must the INITIATE pushbutton be pressed for the system to initiate the bootload program? (ANS: One time.)

What equipment will be used when loading the IPLD? (Answer: VDT, LPU, SDU, PROC 1 or 2 and FDD.)

NOTES: The next step must be completed within 5 seconds after diagnose status changes to 000000.

Show Slide 4.

Refer students to TM 11-5805-790-12-1, pg 2-70.

c. PROGRAM TEST thumbwheels.

- (1) Set the right PROGRAM TEST thumbwheel switch to the desired number for the VDT being used (that is, VDT C, the number will be set to 3).
- (2) Set the left PROGRAM TEST thumbwheel switch to the desired number for the FDD which contains the PLD (that is, for using FDD A, thumbwheel will be set to position 1).

NOTE: Show Slide 5.

d. Load standby routine.

1H

NOTES: Refer students to TM 11-5805-790-12-1, para 2-27(c). Explain that the following procedure is performed at the supervisory position VDT. The display given in the display column of the following tables appear in the supervisory command input/response partition of the VDT. Upon entry, the response also appears.

Show Slide 6.

Have students open their books to page 2-71 of TM 11-5805-790-12-1 and follow each step given.

(1) VDT display and responses.

- (a) MEMORY TEST IN PROGRESS (no response).
- (b) SVOP FDD IPLD A 10 SVCL FDD IPLD A 10 (no response).
- (c) ENTER DEVICE ID FOR LPU SBY. ENTER "N" IF PRINTER IS NOT TO BE ASSIGNED TO (A).
- (d) SVOP LPU SBY A 16 SVOP FDD IPLD A 10 (after one minute) MSLD LOAD
SUMMARY: 00 ERRORS
00 POSSIBLE ERRORS
VER=v REV=rr DBID=dd
(no response).
- (e) ENTER YR DAYTIME? (that is, 94 0011300).
- (f) NEXT JOB=????

NOTE: Explain that the processor is now in the standby/off-line configuration. With the exception of maintenance and fault isolation job (LFIM) and the reload programs and database jobs (MSLD), all further operations require a logged-on user.

- 1. LGON (administrator /supervisor).
- 2. XXXX is user ID.
- 3. yyyyyyy is user's password.

NOTES: Show Slides 2 and 3.

Refer students to TM 11-5805-790-12-1, para 2-27(d).

1H 30M

3. Dual processor startup.

- a. On the processor that is now at the standby/off-line condition, enter the following commands:

- (1) CONF, the response back from the standby processor should be " WHICH CONFIGURATION FUNCTION? "
- (2) CONN VDT C (select VDT other than one which is assigned to processor which has been started).
- (3) CONN LPU B (select LPU other than one which is assigned to processor which has been started).
- (4) CONN FDD A (select FDD containing the PLD).

NOTE: You must have at least the above mentioned equipment configured prior to continuing to the next step.

- b. Start up second processor with first processor in off-line/standby status.

- (1) On status and control panel of CPU which is to be started, set PROGRAM TEST thumbwheel switches (1 and 2) to octal device address of FDD where PLD is mounted (10 for FDD A, 11 for FDD B).
- (2) On CPU, press RESTART pushbutton.

NOTE: The next two steps must be performed within a limited time period.

- (3) On CAP press PROGRAM LOAD pushbutton (twice).
- (4) The CPG then begins to run a diagnostic test which takes several minutes. The diagnose status display reads a series of numbers ranging from 777777 to 000000.

NOTE: The next step must be completed within 5 seconds after diagnose status changes to 000000.

- c. PROGRAM TEST thumbwheels.

NOTES: Show Slide 7.

Refer students to TM 11-5805-790-12-1,
pg 2-70.

- (1) Set the right PROGRAM TEST thumbwheel switch to the desired number for the VDT being used (that is, VDT C, the number will be set to 3).
- (2) Set the left PROGRAM TEST thumbwheel switch to the desired number for the FDD which contains the PLD (that is, for using FDD A, thumbwheel will be set to position 1).

d. Load standby routine.

NOTES: Show Slide 8.

Refer students to TM 11-5805-790-12-1, para 2-27(c).

Explain that the following procedure is performed at the supervisory position VDT. The display given in the display column of the following tables appear in the supervisory command input/response partition of the VDT. Upon entry, the response also appears.

Show Slide 9.

Have students open their books to page 2-71 of TM 11-5805-790-12-1 and follow each step given.

VDT display and responses

- (a) MEMORY TEST IN PROGRESS (no response).
- (b) SVOP FDD IPLD A 10.
SVCL FDD IPLD A 10 (no response).
- (c) ENTER DEVICE ID FOR LPU SBY. ENTER "N" IF PRINTER IS NOT TO BE ASSIGNED TO A.
- (d) SVOP LPU SBY A 13
SVOP FDD IPLD A 10
MSLD LOAD SUMMARY: 00 ERRORS
00 POSSIBLE ERRORS
VER=v REV=rr DBID=dd (no response).

- (e) ENTER YR DAYTIME?
(that is, 94 0011300)
- (f) NEXT JOB=????

NOTE: Explain that the processor is now in the standby/off-line configuration. With the exception of maintenance and fault isolation job (LFIM) and the reload programs and database jobs (MSLD), all further operations require a logged-on user.

1. LOGON (administrator/
supervisor).
2. XXXX is user ID.
3. yyyyyyy is user's password.

QUESTION: Who is authorized to LOGON when bringing the system on-line? (ANS: Administrator or Supervisor.)

NOTE: You may now bring either processor on-line using next procedure (para 2-27e).

e. Bring processor on-line.

NOTES: Show Slide 10.

Refer the students to TM 11-5805-790-12-1, para 2-27(e), page 2-75.

- (1) At the NEXT JOB prompt, your first step is to LOGON as administrator or supervisor.
- (2) System will return to NEXT JOB prompt.
- (3) Enter MPLD (message program load).
- (4) LIST DEVICES TO BE IGNORED (if none type END and hit Xmit).
- (5) LIST DEVICES TO BE UNAVAILABLE (if none type END and hit Xmit).

NOTES: If there are devices to be ignored, students will list the devices separated by spaces, after all devices are listed complete the command with the letters END and hit Xmit.

Explain to students the process abbreviated, or "stall", cycle. The STL alarm appears on the SSF-VDT display. Ensure you check the

status of the equipment, if not as desired, enter commands to correct it (see Chapter 5).

The CFN system alarm must be removed by making at least four SDUs available using the YAVL command.

Refer students to TM 11-5805-790-12-1, para 2-27, pg 2-79 for Startup Error Messages and explain each one.

3H

4. Practical exercise. During the practical exercise, observe the students on their ability to perform the learning objective; coach, if necessary. Have two students work together on equipment during the practical exercise. Students awaiting or having completed hands-on training will study their notes. Rotate students by roster.

a. Explanation to students.

- (1) This practical exercise is divided into two parts. You will perform Part One in the switch area.
- (2) In Part One, you will perform single and dual processor start-up procedures.
- (3) In Part Two, you must correctly answer 14 out of 20 questions on processor start-up procedures in 1 hour.
- (4) In either part, if it is not clear what you are required to do, ask your instructor for clarification.
- (5) When you feel confident that you can correctly perform dual processor start-up procedures within 30 minutes, ask one of your instructors to evaluate your work.

b. Application by students.

- (1) In Part One, you will perform single and dual processor start-up procedures.
- (2) In Part Two, you must correctly answer 14 out of 20 questions on processor start-up procedures in 1 hour.

- (3) In either part, if it is not clear what you are required to do, ask your instructor for clarification.
 - (4) When you feel confident that you can correctly perform dual processor start-up procedures within 30 minutes, ask one of your instructors to evaluate your work.
- c. Evaluation. Evaluate students on both parts of the practical exercise. In Part One, evaluate each student's ability to correctly perform dual processor start-up procedures within 30 minutes. In Part Two, evaluate each student's ability to correctly answer 14 out of 20 questions on dual processor start-up procedures within 1 hour.

19H 57M

SUMMARY:

You have now completed your training program on processor start-up procedures for the message switch AN/TYC-39A. During your future assignments, you will be required to perform processor start-up procedures as well as other tasks.

With the skills and knowledge learned during this training session, you will be successful in accomplishing this task.

20H

END

This document supports Task Numbers 113-603-2198, 113-603-1048
and 113-603-3225.

ANSWER KEY D01-LP5

1. To run CPG diagnostics and initiate PLD loading from a boot device.
2. FDD (floppy disk drive) or SDU (storage device unit).
3. The "write enable" or "write data" or "unlocked" position.
4. VDT A.
5. SVOP: service open
LPU: line printer unit
SBY: standby mode
A: device ID
16: octal device address
6. Standby/off-line mode.
7. MPLD (message processor load).
8. SDUs E and F.
9. ABCY D (abbreviated cycle - disallow).
10. CONF (configuration).
11. Two control and two history.
12. SDU D = 45.
13. Insert circuit guard plugs in the Y-community jacks.
14. Abbreviated cycle - disallow.
15. yy (last two digits of year) ddd (Julian day) tttt (time).
16. \$ (dollar sign).
17. Devices down for maintenance and not available for on-line use.
18. Repeat MPLD command.
19. Set PROGRAM TEST thumbwheels to appropriate boot and display devices.
20. Successful completion of CPG diagnostic test.

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LESSON PLAN

TITLE: AN/TYC-39A Commands

LEARNING

OBJECTIVE: Action: The students will identify the use and format of commands and answer written questions on AN/TYC-39A commands.

Conditions: The students will be given TMs 11-5805-790-12-2, 3, and 5; and Practical Exercise, 150-74G10/D01-LP6-PE.

Standard: Acceptable performance is achieved when the student correctly answers 7 out of 10 questions within 30 minutes.

SAFETY

CONSIDERATIONS: There are no safety consideration for this lesson plan.

RISK

ASSESSMENT: A risk assessment has been conducted on this unit of instruction and the risk level is deemed to be: LOW RISK.

RESOURCE
NEEDS/

REFERENCES: TMs 11-5805-790-12-2, 3, and 5, Overhead Projector, and Slides 1-31.

METHODS OF
INSTRUCTION:

Conference, Practical Exercise

TIME: 4 Hours

NOTES TO INSTRUCTOR:

1. Ensure that all training resources are available.
2. Ensure that all safety procedures and practices are followed.
3. Fully explain commands that are used extensively during operation/maintenance of the message switch (MS). References are provided to have students follow along during the discussion.

INTRODUCTION:

Elapsed Time	This lesson focuses on the commands of the AN/TYC-39A. Commands instruct the processor to perform many operations. You will learn command categories and their function and use of each command, and it's defined format. You will answer questions about the various commands, with a time limit of 30 minutes to perform these tasks.
-----------------	---

BODY:

NOTES: Show Slide 1.

Explain that some commands overlap areas.

1. Commands are generally broken down into two areas of operation.
2. Commands are further broken down into categories within these areas.

NOTE: Show Slide 2.

3. On-line commands are used for supervisory functions; traffic service functions; combined functions (SSF/TSF); remote traffic service functions; and security operation functions.

NOTES: Show Slide 3.

Reference TM 11-5805-790-12-2, para 3-5, pg 3-16.

- a. Access commands are part of the security system which determines user types and their authorizations.

- (1) **LGON** - Logon to the video display terminal (VDT) with user ID/password.
- (2) **LGOF** - Logoff the VDT.

NOTES: Show Slide 4.

Reference TM 11-5805-790-12-2, para 3-7, pg 3-18.

- b. Security commands maintain the User ID/Password table and report system usage, violations or abnormalities.

- (1) **AUDF** - Full audit report request.
- (2) **AUDU** - Audit report requested by user.
- (3) **PASS** - Define/Change passwords (TGEN).
- (4) **UCHG** - Change a user ID (TGEN).
- (5) **UDEL** - Delete a user ID (TGEN).

NOTES: Show Slide 5.

Reference TM 11-5805-790-12-3, para 5-33, pg 5-276.

- c. ABBREVIATED CYCLE command is sometimes called CYCLE STALL and determines whether messages are processed.

ABCY - Allow/Disallow Abbreviated cycle (input and output).

NOTES: Show Slide 6.

Reference TM 11-5805-790-12-3, para 5-34, pg 5-279.

- d. CANCEL STATISTIC REPORT command cancels all user-requested reports that are queued for printout.

CANP - Cancel statistic report.

NOTES: Show Slide 7.

Reference TM 11-5805-790-12-3, para 5-17, pg 5-35.

e. CHANNEL MANAGEMENT COMMANDS place channels in- and out-of-service, modify sequence numbers, perform mode changes, and allow/disallow message rejection on Mode II/V lines.

- (1) **CCSR** - Cycle a channel service state by channel number.
- (2) **LCSR** - Cycle a channel service state by line termination unit (LTU) number.
- (3) **CISR** - Put channel(s) in-service by channel number.
- (4) **LISR** - Put channel(s) in-service by LTU number.
- (5) **COSR** - Place group of channels out-of-service by channel number.
- (6) **LOSR** - Put channel(s) out-of-service by LTU number.
- (7) **XMIT** - Allow message transmission on Mode II line.
- (8) **MSMS** - Initiate/Terminate MS-to-MS by CS contingency trunk service.
- (9) **RCSN** - Request channel sequence number.
- (10) **RTOV** - Retransmission override - allow/disallow.
- (11) **CM25** - Change Mode II line to Mode V.
- (12) **CM52** - Change Mode V line to Mode II.

30M

NOTES: Show Slide 8.

Reference TM 11-5805-790-12-3, para 5-26, pg 5-222.

f. CONFIGURATION commands gives the ability to adapt the system to changing conditions by changing the status of the system's devices.

- (1) **CLOS** - Close an on-line device.
- (2) **CONN** - Connect a device to the off-line processor.
- (3) **CONN TED** - Connect TED to off-line time division interface module (TDIM).

- (4) **DCON** - Disconnect device from off-line processor.
- (5) **NAVL** - Make a device unavailable for on-line use.
- (6) **YAVL** - Make a device available for on-line use.
- (7) **NIGN** - Remove ignore status for a device.
- (8) **YIGN** - Ignore status for a device.
- (9) **SDCN** - Disconnect device from off-line processor (special disconnect).
- (10) **OPEN DBI** - Open an on-line database command input file.
- (11) **CLOS DBO** - Close an on-line database command output (DBO) file.

NOTES: Show Slide 9.

Reference TM 11-5805-790-12-3, para 5-35, pg 5-280.

- g. Continue with SINGLE CONTROL storage device unit (SDU) command allows operation of the MS with only one control SDU.

SCSD - Continue with single control SDU.

NOTES: Show Slide 10.

Reference TM 11-5805-790-12-3, para 5-29, pg 5-255.

- h. The DATABASE PRINT command is used to obtain printouts that reflect the site-specific database operated by TGEN.

DABA xxx - Request database printouts.

NOTES: Show Slide 11.

Reference TM 11-5805-790-12-3, para 5-27, pg 5-234.

- i. MAINTENANCE and EQUIPMENT commands enable loopback tests, request equipment status,

reset a modem, reset an MTG, and perform device self-checks.

- (1) **CHEK** - Initiate device self-checks.
- (2) **DIAG** - Request MCS/CCIU diagnostic loopback test.
- (3) **ECMD LPBM** - Put modem in loopback mode.
- (4) **ECMD REQS** - Request equipment status.
- (5) **ECMD RSET MODEM** - Reset modem.
- (6) **ECMD RSET MTG** - Reset master timing generator.
- (7) **LPBK** - Initiate loopback tests.

NOTES: Show Slide 12.

Reference TM 11-5805-790-12-3, para 5-25, pg 5-211.

1H

- j. MESSAGE CONTROL commands give the ability to cancel or reject messages and "dry-up" all message input.

- (1) **CMSG** - Request channel check message transmission.
- (2) **CNCL** - Cancel an output message.
- (3) **DRUP** - Dry-up all message input.
- (4) **NLIM** - Remove routing indicator (RI) from "Limbo" status.
- (5) **RABM** - Release answerback monitor.
- (6) **RDRT** - Retry critic deterministic routes.
- (7) **REJM** - Reject an input message.
- (8) **RORB** - Retransmit message(s) on orbit suspense line.
- (9) **SCRB** - Scrub an output message.

NOTES: Show Slide 13.

Reference TM 11-5805-790-12-3, para 5-18, pg 5-52.

- k. MESSAGE DIVERSION is the sending of a message to other than its intended destination. There are four types of message diversions:

NOTES: Show Slide 14.

Reference TM 11-5805-790-12-3, para 5-19,
pg 5-53.

- (1) REINTRODUCTION (REIN) is the process of automatically readdressing a message by prefixing it with a new header containing a specified RI.
 - (a) **GORN** - Activate reintroduction for individual RI.
 - (b) **GORN ALL** - Activate reintroduction all RIs.
 - (c) **NORN** - Deactivate reintroduction for individual RI.
 - (d) **NORN ALL** - Deactivate reintroduction all RIs.

NOTES: Show Slide 15.

Reference TM 11-5805-790-12-3, para 5-20,
pg 5-58.

- (2) Intercept (IC) is a method of relieving or preventing excessive message delivery backlogs.
 - (a) **GOIC** - Route messages to IC.
 - (b) **NOIC** - Stop routing messages to IC.

NOTES: Show Slide 16.

Reference TM 11-5805-790-12-3, para 5-21, pg
5-67.

- (3) Alternate (ALT) routing deals with the alternate routing of messages by a MS for channels or RIs.
 - (a) **ALTC** - Implement ALT routing of a channel.
 - (b) **ALTR** - Implement ALT routing of a RI.
 - (c) **NALC** - Discontinue channel altroute.
 - (d) **NALL** - Discontinue channel altroute of all destinations assigned.

- (e) **NALR** - Discontinue ALT routing of a RI.

NOTES: Show Slide 17.

Reference TM 11-5805-790-12-3, para 5-22, pg 5-86.

1H 30M

- (4) Overflow is a method of relieving excessive message delivery backlog and depletion of system resources.

OVFT - Change queue and intransit storage overflow thresholds.

NOTES: Show Slide 18.

Reference TM 11-5805-790-12-3, para 5-24, pg 5-169.

- 1. Message trace and retrieval allows you to trace events associated with a set of messages selected by certain input or output criteria.

- (1) **CANR** - Cancel retrieval(s).
- (2) **CANT** - Cancel trace(s).
- (3) **CONT** - Continue/Discontinue a trace.
- (4) **RETR** - Retrieve messages.
- (5) **TRAC** - Trace messages.

NOTES: Show Slide 19.

Reference TM 11-5805-790-12-3, para 5-32, pg 5-273.

- m. Network control routing reports (NCRRs) are generated by the system whenever a password change command, a STAT PAS command, or a command that potentially affects the system routing plan is entered.

NCRR - Network control routing report (activate/deactivate).

NOTES: Show Slide 20.

Reference TM 11-5805-790-12-3, para 5-28,

pg 5-246.

- n. On-line Table Generation (TGEN) is used to initialize and modify parts of the site-specific database.
 - (1) **GOST** - Write database generation (TGEN) command to DBO.
 - (2) **NOST** - Terminate writing of database generation (TGEN) command to DBO.
 - (3) **RICH** - Specify input parameters and passwords for TGEN.
 - (4) **RICH V SEC** - Initiate security or ECP changes from VDT.

NOTES: Show Slide 21.

Reference TM 11-5805-790-12-3, para 5-30, pg 5-267.

- o. Operator Directives allow supervisor commands from other than the SSF-VDT position.
 - (1) **&CLS** - Close SSF VDT.
 - (2) **&nnn** - Display designated channel.
 - (3) **&SUP** - Allow one command to be input.
 - (4) **&CAN** - Allow message to be edited multiple times.
 - (5) **&LGY** - Allow LOGS.
 - (6) **&LGN** - Inhibit LOGS.
 - (7) **&ABT** - Abort DABA print.

NOTE: Show Slide 22.

Reference TM 11-5805-790-12-3, para 5-31, pg 5-271.

2H

- p. Scrub Resolution Procedure means to remove the requirement to send the message to the addresses. The MS terminates it's responsibility for delivering the message.

SACK - Acknowledge scrub.

NOTES: Show Slide 23.

Reference TM 11-5805-790-12-3, para 5-23, pg 5-88.

- q. STATUS (STAT) commands provide printouts of equipment and traffic status to the supervisor.

STAT xxx - Request status or information.

NOTES: Show Slide 24.

Reference TM 11-5805-790-12-5, para 6-3, pg 6-2.

- 4. All off-line jobs are located on Program Library Disk (PLD) B. The off-line operation allows you to perform the jobs listed below.
 - a. Diagnostics.
 - b. Utility jobs.
 - c. Memory jobs.
 - d. TGEN job.
 - e. Database/Table Edit job (DABA).
 - f. Recovery job (RECO).
 - g. Configuration jobs (CONF).

NOTES: Show Slide 25.

Reference TM 11-5805-790-12-5, para 6-3, pg 6-2.

Point out **ERROR** that the processor number can **NOT** be changed with this command.

2H 30M

- (1) Date allows you to correct the system's year, day, hour, and minute settings.

DATE - Change date or time.

NOTES: Show Slide 26.

Reference TM 11-5805-790-12-5, para 6-27, pg 6-20.

- (2) Utility jobs allow you to copy disks and display and/or print the contents of disks or memory.

- (a) **DINL** - Initialize disk (SDU).
- (b) **DTOP** - Disk print (SDU).
- (c) **FCMP** - Floppy disk compare.
- (d) **FINL** - Initialize floppy disk.
- (f) **FTOF** - Copy floppy disk.
- (g) **PTOD** - Copy PLD to SDU.
- (h) **VTOF** - VDT to floppy disk.

NOTES: Show Slide 27.

Reference TM 11-5805-790-12-5, para 6-35, pg 6-40.

- (3) The Memory job enables you to get a printed listing of the contents of a selected area of memory.

DUMP - Dump memory to printer.

NOTES: Show Slide 28.

Reference TM 11-5805-790-12-5, para 6-36, pg 6-41.

3H

- (4) The TGEN job is used to initialize or modify the routing and control tables of a PLD.

TGEN - Table generator.

NOTES: Show Slide 29.

Reference TM 11-5805-790-12-5, para 6-43, pg 6-235.

- (5) Data Base/Table Edit job is used to obtain various printouts (edits) of data from the routing and control tables contained in PLD B.

DABA - Database print request.

NOTES: Show Slide 30.

Reference TM 11-5805-790-12-5, para 6-44,
pg 6-274.

- (6) The Recovery function restores MS operation following a processor failure. The system is restored to the state it was in before the failure.

RECO - Recovery procedure.

NOTES: Show Slide 31.

Reference TM 11-5805-790-12-5, para 6-45, pg
6-279.

- (7) Configuration jobs are used to verify the connectivity and functional assignment of the ADPs to various devices in the off-line system.

- (a) **CONF** - Configuration function.
- (b) **CONN** - Connect a device to off-line processor.
- (c) **SHOW** - Show CAP configuration devices.
- (d) **DCON** - Disconnect an off-line device.

3H 25M

- 5. Practical exercise. During the practical exercise, observe the students on their ability to perform the learning objective; coach, if necessary.

a. Explanation to students.

- (1) You must correctly answer 7 of 10 written questions on commands within 30 minutes.
- (2) If it is not clear what you are required to do, ask your instructor for clarification.

b. Application by students.

- (1) Correctly answer 7 out of 10 of the written questions on commands within 30 minutes.
 - (2) If it is not clear what you are required to do, ask your instructor for clarification.
 - (3) When you are finished have your instructor grade your answers.
- c. Evaluation. Evaluate each student ability to correctly answer 7 out of 10 written questions within 30 minutes.

3H 55M

SUMMARY:

You have now completed your training on AN/TYC-39A commands and their use. During your future assignments, you will be required to perform many of these commands as well as other procedures. With the skills and knowledge learned during this training session, you will be successful in accomplishing this task.

4H

END

This document supports Task Number 113-603-2198.

ANSWER KEY D01-LP6

1. On-line and off-line operation
2. LGON (logon) and LGOF (logoff)
3. ABCY A/D
4. CISR
5. CONN
6. YAVL
7. LPBK CHN 020 MODEM
8. STAT CHN
9. DINL
10. FTOF

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LESSON PLAN

TITLE: AN/TYC-39A Video Display and Terminal Operations and
Use

LEARNING

OBJECTIVE: Action: The student will identify the
VDT/KB controls, indicators and
control areas of assigned screens.

Conditions: Given an operational AN/TYC-39A, TM
11-5805-790-12 Series, and
practical exercise 150-74G10/D01-
LP06-PE.

Standard: Acceptable performance is achieved
when the student can correctly
answer 7 out of 10 written
questions within 30 minutes.

SAFETY

CONSIDERATIONS: There are no safety considerations for this
lesson.

RISK

ASSESSMENT: LOW.

RESOURCE

NEEDS/

REFERENCES: AN/TYC-39A, TM-11-5805-790-12 Series, practical
exercise 150-74G10/D01-LP06-PE, overhead
projector, and slides 1-23.

METHODS OF

INSTRUCTION: Conference, Practical Exercise.

TIME: 4.0 Hours

NOTES TO INSTRUCTOR:

1. Ensure all training resources are available.
2. Ensure all safety procedures and practices are
followed.

150-74G10\D01-LP7

1

APPROVAL DATE: 27 NOV 97

DEVELOPER: SFC CARTAGENA

DIV. CHIEF: Jack P. Rendon

3. Ensure all equipment is operational.
4. Evaluate students on their ability to perform the learning objective during the practical exercise.

INTRODUCTION:

- Elapsed Time
1. As an operator/maintainer of the AN/TYC-39A message switch a knowledge of the video display terminal will give you a better understanding of how the different equipment/components interface to provide message switching communications.
- 3M
2. Let's begin our study by briefly discussing the purpose and use of the video display terminal (VDT/KB) that you will be using in the AN/TYC-39A.

BODY:

1. Video display unit (VDT).

NOTE: Refer students to TM 11-5805-790-12-1, para 2-29(a).

- a. The visual display terminal (VDT) is the operator's means of communicating with the central processor group (CPG). The VDT consist of a video display monitor and a keyboard. The keyboard is a MIL-STD-1280, type 1 device with compliment of controls which provide for entry to the VDT/KB controller via the CPG for operator instructions, character by character, and edit controls.

- b. Use of video display terminal.

- (1) The VDT consists of a video display monitor and a keyboard.
- (2) There are three VDT/KB's per message switch. The three devices are functionally interchangeable and are assigned to one of the five operating functions:

- (a) Traffic Service - TSF (Ref TM 11-5805-790-12-2, Chap 4.)

(b) Supervisory - SSF (Ref TM 11-5805-790-12-3, Chap 5.)

(c) Combined TSF and SSF - COM (Ref TM 11-5805-790-12-2, Chap 4, Ref TM 11-5805-790-12-3, Chap 5.)

(d) Off-line standby - OFL/SBY. (Ref TM 11-5805-790-12-5, Chap 6.)

(e) SSO - System Security Officer. (Ref TM 11-5805-790-12-2, Chap 3.)

- c. Each VDT operates in one or more operating mode depending on the function it is serving. Detailed explanations of each operating mode and descriptions of the different screen displays are given in the chapters referenced earlier in this lesson.

QUESTION: What is the purpose of the video display terminal? (ANS: The video terminal provides the display of operator generated instructions, action notification from the CPG.)

2. Video display monitor (Screen).

NOTE: Refer to TM 11-5805-790-12-1, para 2-29 (b).

The screen is a matrix of partitions and fields. It has 25 lines with 80 characters per line. The partitions consist of one or more lines of the display.

QUESTION: What is the purpose of the video display monitor? (ANS: The video display monitor provides a matrix of partitions and fields that consist of one or more lines of the display that provide interface between the operator and the processor.)

3. System control partition.

NOTE: Explain that the system control partition is read from left to right.

- a. The system control partition is the first line on the screen display for all VDT functions and modes of operation.

NOTE: Show Slide (1). (Refer students to TM 11-5805-790-12-3, para 5-6)

- b. It is a protected area (cannot be written on) and provides the operator with systems information relating to the following:

- (1) Operator's identification user ID
- (2) Processor number the VDT is currently assigned to (PO, P1, or P2).
- (3) Processor function the VDT is currently serving. (TSF, SSF, COM, or OFL/SBY).
- (4) Current operating mode of the VDT (SYS-LOG, SYS-SUM, SYS-EDT, VDT-LPU, VDT-SYS, TSD-PUT, TSD-GET, TSD-MOD or TSD-DEL).
- (5) Current job the VDT is performing (MP - when VDT is assigned on-line, or any one of 12 off-line jobs).
- (6) Alarm Active.
- (7) Edit Queue.
- (8) Last Directive.
- (9) Directive Response.
- (10) Query Response.
- (11) Active Query.
- (12) Last Function Key.
- (13) Response Function Key.

- c. The contents of certain fields of the system control is different for each VDT function. The remaining 24 lines of the screen display are also different for each VDT function and operating mode.

QUESTION: What is the purpose of the system control partition? (ANS: The system control partition provides current equipment status and operational information.)

- 4. Video display Terminal operation.

- a. Turn on video display terminal.

- (1) Set power on/off switch on.
- (2) Power ready indicator lights.
- (3) Cursor appears in home position on screen.

NOTE: Explain to students that until a processor is bootloaded and the VDT is configured to the processor, no other image will appear on screen except data entered at the keyboard.

However, when processors are bootloaded and the VDTs are assigned to a function (OFL/SBY, TSF, SSF or COM), the appropriate image appears on the respective screens.

- b. Adjust screen contrast.

Rotate contrast control until the screen contrast is at the lowest comfortable level.

- c. VDT screen control.

NOTE: Explain to student that when the VDT is serving the OFL/SBY or TSF function and the entire screen display is filled with data, a special blinking query (NEXT PAGE?) is displayed in the system control partition.

QUESTION: What is the position of the cursor when the VDTs are turned on? (ANS: The cursor appears in home position on the screen.)

45M

5. Keyboard and cursor.

- a. Keyboard.

NOTE: Refer students to TM 11-5805-790-12-1, para 2-29(c).

- (1) Input to the system is through the keyboard.

NOTE: Explain that when you strike a character on the keyboard it appears on the screen in front of the cursor.

(2) You will be required to become familiar with the different screen displays for each VDT function in order to determine the position of the cursor and how many lines you are allowed to input for each VDU function and operating mode.

(3) Under normal operating conditions you begin with the cursor in the home position.

b. Cursor positioning keys.

NOTES: Show Slide (2). Refer students to TM 11-5805-790-12-1, para 2-29(d), and explain in detail as required.

Explain location and use of cursor positioning keys.

c. Keyboard operation keys.

NOTES: Show Slide (3). Refer students to TM 11-5805-790-12-1, para 2-29, and explain in detail as required.

Explain location and use of operation keys.

d. Function keys.

NOTES: Show Slide (4). Refer students to TM-11-5805-790-12-1, para 2-29, and explain in detail as required.

Explain location and use of function keys.

e. Standard keyboard keys.

NOTES: Show Slide (5). Refer students to TM-11-5805-790-12-1, para 2-29 (g), and explain in detail as required.

Explain location and use of standard keyboard keys.

QUESTION: What is the purpose of the video display unit? (ANS: The video display unit is the operators means of communicating with the automatic data processor.)

1H

6. Introduction to traffic service operation.

a. Traffic service position.

NOTE: Refer students to TM 11-5805-790-12-2, para 4-6, pg 4-3. Explain in detail.

The traffic service position consists of a video display terminal and a line printer unit. VDT B and LPU B are usually assigned to traffic service, but any available VDT and LPU can be used.

b. Traffic service functions.

NOTES: Show Slide (6).

Explain the allowable traffic service functions and where they can be performed.

c. Traffic service display areas.

NOTE: Show Slide (7).

The 25 lines of the traffic service display are divided into different areas. Each area has a different set of VDT mnemonics that may be seen. There are four (4) areas and one (1) spare.

(a) System control area.

NOTE: Show slide (8) and explain.

The first row of the display gives you information about the system. It is divided into 13 fields.

(b) Traffic service control area.

NOTE: Show Slide number (9) and explain.
The second row of the display gives you information on the current message status. It is divided into seven fields.

(c) Traffic service operator command input area.

NOTE: Show Slide (10) and explain.

The bottom 18 rows of the display are used to compose and edit messages.

(d) Traffic service log entries/messages displayed for editing.

NOTE: Show Slide (11) and explain.

In the SYS-LOG mode, the bottom 15 rows of the display are used for log entries.

QUESTION: What are the traffic service display areas?
(ANS: The traffic service display areas are system control, traffic service control, traffic service operator command input, and traffic service log entries/messages displayed for editing.)

1H 15M

7. Combined traffic service and supervisory display.

NOTES: Refer students to TM 11-5805-790-12-2, para 4-3, pg 4-2. Explain in detail as required.

Show Slide (12) and explain.

a. The combined traffic service and supervisory display has seven display areas plus three spares as follows:

- (1) System control.
- (2) Traffic service control.
- (3) System alarms.
- (4) Individual channel status readout.

- (5) Supervisor command response.
- (6) Equipment status summary.
- (7) Channel status summary.

- b. Traffic service and supervisory operations may be combined on one VDT, in certain situations, separate LPUs will still be used.
- c. Traffic service operations are unchanged except that no log entries are displayed.

QUESTION: How many display areas are used in the traffic service and supervisory display?
(ANS: There are seven display areas used with the traffic service and supervisory display.)

8. Remote traffic service position.

NOTE: Refer students to TM 11-5805-790-12-2, para 4-4, pg 4-2.

- a. A message switch subscriber terminal may be assigned traffic service operations for one or more subscriber communities (R, Y, or U.)
- b. This is done in the data base classmarks for the remote terminal.
- c. Remote terminals can not perform all traffic service procedures, and will need operator assistance.

QUESTION: Will a remote terminal perform all traffic service procedures? (ANS: Remote terminal cannot perform all traffic service procedures.)

1H 30M

9. Introduction to supervisory position.

- a. Supervisory position.

NOTE: Refer students to TM 11-5805-790-12-3, para 5-2, pg 5-1.

- (1) The supervisory position consists of a video display terminal, a line printer, and the configuration and alarm panel.

- (2) The VDT and LPU usually assigned to supervisory use are VDT A and LPU A in the MCS.
- (3) Any available VDT and LPU can be used.

b. Supervisory functions.

NOTE: Refer students to TM 11-5805-683-12-3, para 5-4, pg 5-2.

- (1) Interpret displays.
- (2) Use supervisory commands.
- (3) Use operator directives.
- (4) Interpret on-line operational printouts.
- (5) Interpret traffic printouts.

c. Supervisory display.

NOTE: Show Slide (13) and explain. Refer students to TM 11-5805-790-12-3, para 5-5, pg 5-2. The 25 lines of the supervisory display are divided into eight different areas. Each area has a different set of VDT mnemonics that may be seen.

- (1) System control area.

NOTE: Show Slide (14) and explain.

The first row of the display gives you information about the system.

The row is divided into 13 fields.

- (2) System alarms area.

NOTE: Show Slide (15) and explain.

The third row of the display gives you information on system alarms. Up to 20 serious system alarms can be displayed here.

- (3) Individual channel status readout area.

NOTE: Show Slide (16) and explain.

Rows 4 and 5 of the display give you information about a particular channel which is alarming or which you have requested for display and is divided into 12 fields, seven in row 4 and five in row 5.

NOTE: Explain to students that you can acknowledge channel or equipment status alarms by completing the following steps as required:

2H

1. Press ACKT key (function key 3):
 - a. Causes first blinking channel in channel status summary partition to become steady.
 - b. Displays status of this channel in individual channel status readout partition.
 - c. Prints channel status on supervisory position printer.
2. Pressing ACKT is followed by pressing ACK (function key 1) or
 - a. STAT command is used or
 - b. &NNN directive is used.
3. Using STAT command to get a detailed channel/equipment status printout.
4. Acknowledgment will cause the alarms to stop blinking if the problem still exists, or to disappear if the problem has been fixed.

(4) Supervisory command input/response area.

NOTE: Show Slide (17) and explain.

- (a) Rows 8-10 of the display are where you type in supervisory (SUPE)

commands and receive system responses.

- (b) SUPE commands may be 4 to 160 characters long.
- (c) They are entered in the first two lines of this area. SUPE command responses are 13 to 80 characters long. They appear in the line following the SUPE command input.
- (d) The responses will be either ACK (acknowledged) or NAK (not acknowledged).
- (e) All SUPE commands and responses are logged at your LPU.

(5) Equipment status summary area.

NOTES: Show Slide (18).

Rows 14-19 of the display show you the status of all devices by name. Up to six devices can be listed alphabetically or numerically. To find the status of a device:

- (a) Locate type of device by reading down one of four device name columns.
- (b) Read across the tops of the device status columns until you find the letter or number of the device you want.
- (c) The intersection of the device name row and status column shows the status of that particular device.

NOTE: Refer to TM 11-5805-790-12-3, para 5-10, page 5-17 and explain all equipment status codes.

(6) Channel status summary area.

NOTE: Show Slide (19) and explain. Rows 21-25 of the display give you the status of each channel. To find the status of a channel:

- (a) Find the first digit of the channel number in one of the two channel columns.
- (b) Find the second digit of the channel number by reading across

the top of the channel status columns.

NOTE: Refer to TM 11-5805-790-12-3, para 5-11, page 5-18 and explain the channel status codes.

QUESTIONS: What row of the screen of the supervisory video display terminal (VDT) does the system alarms appear? (ANS: Row 3.)

What row of the screen of the supervisory video display terminal (VDT) does the supervisory command response appear? (ANS: Row 10.)

What rows of the screen of the supervisory video display terminal (VDT) does the equipment status summary appear? (ANS: Rows 14 through 19.)

What rows of the screen of the supervisory video display terminal (VDT) does the channel status summary appear? (ANS: Rows 21 through 25.)

2H 15M

10. Maintenance visual display terminal (VDT/KB).

Purpose and use. Provides the operator/maintainer with interface capabilities with the off-line processor and allows the operator/maintainer to perform off-line routines such as:

- (1) Table generation (TGEN).
- (2) Program library disk (PLD) maintenance.
- (3) Provides a redundant backup for the operator and traffic service stations.
- (4) Off-line diagnostics and repair verifications are performed at this position.

QUESTION: What is the purpose of the maintenance VDT? (ANS: Provides the operator/maintainer with interface capabilities with the off-line processor and allows the operator/maintainer to perform off-line routines.)

11. Off-line video display.

NOTE: Show Slide (20) and explain.

- a. The 25 rows are divided into two area's separated by a dashed line.
 - (1) The area above the dashed line is the response/query portion.
 - (2) The area below the dashed line is the display/echo portion of the display.
- b. System control line.

NOTE: Show Slide (21) and explain.

- (1) The system control row is the first row of the screen display.
- (2) Current equipment status and operational information is displayed on line 1.
- c. Response/query area.
 - (1) Lines 2 through 4 of the off-line display are used for your response.
 - (a) As you type in your response on the keyboard, it appears on lines 2, 3, and 4, as necessary.
 - (b) When you finish your response and press XMIT - The cursor returns to the beginning of line 2 and your response moves to the next available line in the display/echo portion.
- d. Current query.

Lines 5 through 7 display the current query. The same query is simultaneously displayed on the next available line in the display/echo portion of the display.
- e. Separation.

Line 8 is a dashed line separating the response/query area of the display.

- f. Log of query/response plus display notifications. Rows 9 through 25 display information from the system and echo recent queries and responses.

QUESTIONS: How are the 25 rows of the off-line video display divided? (ANS: Divided into two areas).

2H 45M

What is the purpose of lines 2 through 4? (ANS: Lines 2 through 4 are used for your response.)

12. Display /echo area.

NOTE: Show Slide (22) and explain.

Lines 9 through 25 display information from the system and echo recent queries and responses.

QUESTION: What do lines 9 through 25 provide in the display/echo area? (ANS: Lines 9 through 25 display information from the system.)

3H 27M

13. Practical exercise. During the practical exercise, observe the students on their ability to perform the learning objective; coach, if necessary.

a. Explanation to students.

- (1) You must correctly answer 7 of 10 written questions on the VDT within 30 minutes.
- (2) If it is not clear what you are required to do, ask your instructor for clarification.

b. Application by students.

- (1) Correctly answer 7 out of 10 the written questions on the VDT within 30 minutes.
- (2) If it is not clear what you are required to do, ask your instructor for clarification.

(3) When you are finished have your instructor grade your answers.

c. Evaluation. Evaluate each student ability to correctly answer 7 out of 10 written questions within 30 minutes hour.

3H 57M

SUMMARY:

You have now completed your training on how to identify the control areas of assigned screens and list the functions of the VDT/KB controls and indicators. During your future assignments, you will need this information to maintain the other equipment within the switch.

4H

END

This document supports Task Number 113-603-3223.

ANSWER KEY D01-LP07

1. Video display monitor and keyboard
2. SSO - System Security Officer
TSF - Traffic Service
SSF - Supervisory
COM - Combined TSF and SSF
OFL/SBY - Off-line/Standby
3. Partitions and fields
4. Cannot be written in (write protected)
5. XMIT operation key
6. RESET operation key
7. Home position
8. RESET operation key
9. The processor failed to receive the transmitted data
10. NEXT PAGE ?

U.S. ARMY SIGNAL CENTER AND FORT GORDON
Fort Gordon, Georgia 30905-5180

LESSON PLAN

TITLE: AN/TYC-39A Line Printer Unit (LPU)

LEARNING

OBJECTIVE: Action: In Part One, the students will identify LPU controls, indicators, and load paper into the LPU. In Part Two, the students will answer written questions on the LPU.

Conditions: The student will be given the AN/TYC-39A, TM 11-5805-790-12-1, and Practical Exercise, 150-74G10/D01-LP07-PE.

Standard: In Part One, acceptable performance is achieved when the student correctly identifies the LPU controls, indicators, and loads paper into the LPU. In Part Two, acceptable performance is achieved when the student correctly answers 7 out of 10 questions within 30 minutes.

SAFETY

CONSIDERATIONS: This lesson has safety hazards which may cause electrical shock or physical injury. Make sure students remove all jewelry and metal objects such as watches, rings, bracelets, and identification tags.

RISK

ASSESSMENT: LOW.

RESOURCE
NEEDS/

REFERENCES: AN/TYC-39A, TM 11-5805-683-12-1, Overhead Projector, and Slides 1-9.

METHODS OF

INSTRUCTION: Conference, Practical Exercise.

150-74G10\D01-LP08

1

APPROVAL DATE: 27 NOV 97

DEVELOPER: SFC CARTAGENA

DIV. CHIEF: Jack P. Rendon

TIME: 2 Hours

NOTES TO INSTRUCTOR:

1. Ensure that all training resources are available.
2. Ensure that all safety procedures and practices are followed.
3. Ensure that equipment is operational before and after class.

INTRODUCTION:

- Elapsed Time
1. This lesson will focus on the LPU of the AN/TYC-39A. You will use the message switch and TM 11-5805-790-12-1 to identify the LPUs controls and indicators. You will also load paper into the LPU. Finally, you will answer questions about the LPU. You will have 1 hour to perform these tasks.
 2. Let us begin our study by giving a description of the LPU and its purpose.

BODY:

1. Description and use.
 - a. The line printer (LP) operates in conjunction with the line printer controllers (LPCs) which are a part of the CAP.
 - b. The LP line length is 80 characters. It prints 300 lines per minute.
 - c. There are two LPs (A, B,) which are assigned jointly with a VDT A and VDT B.

QUESTION: The LPC is a part of another unit, what is that unit? (ANS: CAP.)

5M

2. Controls and indicators.

NOTE: Show Slide 1 and explain.

- a. PWR indicator (green) - Power. Lights when input power is applied to the printer.
- b. RDY indicator (white) - Ready. Lights when printer is ready to accept data.

- c. FLT indicator (red) - Fault. Lights when printer is out of paper or when gate is open.
- d. PPR indicator (amber) - Paper. Lights when paper supply is low.
- e. Form feed test (FF/TST) switch.
 - (1) When held in the TST position, causes a test pattern of the full complement of characters to be printed.
 - (2) When held in the FF position, advances the paper to the top-of-form position.
- f. Five line feed/slew (5LF/SLW) switch.
 - (1) When held in the 5LF position, advances paper five lines.
 - (2) When held in the slew, slews the paper forward.
- g. LAMP ON/OFF SWITCH - controls lighting of the printout.
- h. HOURS and TENTHS elapsed time indicator - shows the total operating time of the printer.
- i. POWER ON switch - applies input power to the printer.

NOTE: Show Slide 2 and explain.

- j. FORMS THICKNESS THICK/THIN control - adjusts the helix position to the thickness of the paper form being used.
- k. Connector J1 - connects 28 V DC input power to the printer.
- l. Circuit breaker CB1 - provides protection for the printer circuits.
- m. Connector J3 - test connector input signals to the printer.
- n. Connector J2 - connects input signals to the printer.

- o. RUN/LOAD control.
 - (1) Places drive roller tension on paper in RUN position.
 - (2) Releases tension in LOAD position.

QUESTION: What connector provides 28 V DC input to the LPU? (ANS: J1.)

30M

3. Paper loading.

NOTES: Show Slide 3 and explain.

At the VDU, the LPU must be placed in an unavailable, disconnect status before loading paper.

Show Slide 4 and explain.

- a. Remove any remaining paper.
 - (1) Hold FF/TST switch on FF, until all paper is fed out of the printer.
 - (2) Place RUN/LOAD control in LOAD (down) position.

NOTE: Show Slide 5 and explain.

- b. Unlatch and open front cover.
 - (1) Push button to unlock lever arm.
 - (2) Lift lever arm up and back.
 - (3) Lift latch up and back.
 - (4) Swing front cover open.

NOTE: Show Slide 6 and explain.

- c. Access paper box.
 - (1) Pull the two gate latches out to release gate.
 - (2) Swing gate out and up until it locks into place.
 - (3) Open paper box door.
- d. Insert paper into paper box.

- (1) Slide in paper stack part way.
- (2) Pull out two sheets to use as a leader.
- (3) Slide in stack the rest of the way.
- (4) Close paper box door.

NOTE: Show Slide 7 and explain.

e. Feed in and align paper.

- (1) Fold leading edge of paper.
- (2) Insert paper between the guide bar and the lower paper feed roller.
- (3) Thread paper through the exit slot guide and into the stacker.
- (4) Push paper through until it starts to come out the top of the stacker.
- (5) Pull paper up until the fold lines up with the underlined mark on the forms alignment decal.
- (6) Put tension on the paper by gently pulling upward.

NOTE: Show Slide 8 and explain.

- (7) Release gate stop bar and lower the gate.
- (8) Depress gate firmly into place; latches should snap shut.
- (9) Check that knobs on both sides of paper stacker are tight.
- (10) Put tension on the paper by gently pulling paper upward.
- (11) Place RUN/LOAD control in RUN position.

f. Load into stacker - set FF/TST switch to FF to check that paper is stacking properly.

NOTE: Show Slide 9 and explain.

g. Close and latch the front cover.

- (1) Swing front cover closed.
- (2) Swing latch forward.
- (3) Swing lever arm forward and press down to lock latch.

h. Check indicator lamps.

- (1) Check that RDY lamp is lit and that PPR and FLT lamps are out.
- (2) LPU is now ready for use.

QUESTION: What status must the LPU be in before loading paper? (ANS: Unavailable, disconnected.)

1H

4. Practical exercise.

a. Explanation to students. This is a two-part practical exercise.

- (1) Part One. Using the AN/TYC-39A; TM 11-5805-790-12-1; and Practical Exercise, 150-74G10/D01-LP07-PE you will identify the controls and indicators of the LPU. You will also load paper into the LPU.
- (2) Part Two. You must correctly answer 7 out of 10 questions pertaining to the LPU within 30 minutes.
- (3) Use TM 11-5805-790-12-1, to obtain the requested information.
- (4) Use the allotted areas and figures in the practical exercise to list the required information.
- (5) When you finish the practical exercise, have the instructor evaluate your performance.
- (6) If what you are required to do is not clear, ask your instructor for clarification.

NOTE: Students will perform Part One in the message processing shelter (MP) in pairs.

b. Application by students.

- (1) Part One. Using the AN/TYC-39A; TM 11-5805-790-12-1; and Practical Exercise, 150-74G10/D01-LP07-PE the students will identify the controls and indicators of the LPU and load paper into the LPU.
- (2) Part Two. Using TM 11-5805-790-12-1; and Practical Exercise, 150-74G10/D01-LP07-PE the students will answer questions pertaining to the LPU.

- c. Evaluation. During Part One of the practical exercise, evaluate each student to ensure they have the ability to identify the controls of the LPU and can load paper into the LPU in 15 minutes. In Part Two, evaluate each student to ensure they can correctly answer at least 7 out of 10 questions pertaining to the LPU within 30 minutes.

1H 57M

SUMMARY:

You have proven that you can identify the LPU controls and indicators of the LPU and can load paper into the LP.

In upcoming lessons, you will take the knowledge you have acquired and apply it to the overall use of the message switch.

2H

END

This document supports Task Number 113-603-3221.

ANSWER KEY D01-LP08

1. Unavailable and disconnected status.
2. The paper supply is nearing the end.
3. Printer is out of paper or when the gate is open.
4. When the paper supply is down to 20 to 40 sheets.
5. Causes a test pattern of the full complement of characters to be printed.
6. Connector J1.
7. Connector J2.
8. FORMS THICKNESS THICK/THIN control.
9. POWER ON switch and Circuit Breaker CB1.
10. Top-of-form position.

U.S. ARMY SIGNAL CENTER AND FORT GORDON
Fort Gordon, Georgia 30905-5180

LESSON PLAN

TITLE: Maintenance of the AN/TYC-39A Video Display
Terminal (VDT) and Line Printer Unit (LPU)

LEARNING

OBJECTIVE: Action: The students will identify faults through the use of troubleshooting charts and fault isolation diagnostics. In Part Two, the students will answer written questions on the VDT and LPU.

Conditions: The student will be given the AN/TYC-39A, TM 11-5805-790-12-1, TM 11-5805-790-12-7, TM 11-5805-790-12-8 and Practical Exercise, 150-74G10/D01-LP09-PE.

Standard: Acceptable performance is achieved when the student correctly identifies two out of three faults in the VDT or LPU. In Part Two, acceptable performance is achieved when the student correctly answers 14 out of 20 questions within 1 hour.

SAFETY

CONSIDERATIONS: This lesson has safety hazards which may cause electrical shock or physical injury. Make sure students remove all jewelry and metal objects such as watches, rings, bracelets, and identification tags.

RISK

ASSESSMENT: LOW.

RESOURCE

NEEDS/

REFERENCES: AN/TYC-39A, TM 11-5805-683-12-1, TM 11-5805-790-12-7, TM 11-5805-790-12-8 and Practical Exercise, 150-74G10/D01-LP09-PE, Overhead Projector, and Slides 1-20.

150-74G10/D01-LP9

1

APPROVAL DATE: 27 NOV 97

DEVELOPER: SFC CARTAGENA

DIV. CHIEF: Jack P. Rendon

METHODS OF
INSTRUCTION: Conference, Practical Exercise.

TIME: 12 Hours

NOTES TO INSTRUCTOR:

1. Ensure that all training resources are available.
2. Ensure that all safety procedures and practices are followed.
3. Ensure that equipment is operational before and after class.

INTRODUCTION:

Elapsed Time	The LPUs and VDTs are essential pieces of equipment in order to bring the message switch on line. In this lesson you be taught how to troubleshoot LPU and VDT faults using the flow charts and diagnostic routine.
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BODY:

1. LPU troubleshooting charts.
 - a. When there is a problem with a printer, troubleshooting begins with the system-troubleshooting chart.
- NOTE: Refer to TM 11-5805-790-12-8, para 11-1, page 11-4 then to para 12-7, page 12-21.
- b. The system fault isolation chart will direct you to the LPU fault isolation chart.
 - (1) The first part of this flow chart will direct you in eliminating the off-line functions of the line printer.
 - (2) The last part of the flow chart directs you to the on-line functions through a diagnostic test run from the off-line VDT.

30 M

2. Diagnostic LPU M&FI Routine - This routine is performed from the VDT as follows.

- a. Perform the LFIM steps.
- b. At the prompt, enter printer to test (A/B).
- c. At the prompt, enter RUN.
- d. A diagnose code of 760000 is interpreted as no fault detected.

NOTE: Refer students TM 11-5805-790-12-8 para 12-7, page 12-34, DLPU Error Diagnose Codes.

- e. An error diagnose code of 300XXX indicates that a fault has been detected.
 - (1) XXX is a number that corresponds to a particular error.
 - (2) All error diagnose codes should result in replacement of the line printer controller card slot four or five of the controller nest and, if line printer still fails, replacement of the line printer.
 - (3) Check all cables connecting the printer to the processor used in the LFIM job.
 - (4) Check all test printouts for correct patterns and print.

3. VDT troubleshooting charts.

- a. When there is a problem with a VDT, troubleshooting begins with the system-troubleshooting chart.

NOTE: Refer to TM 11-5805-790-12-8, para 11-1, page 11-5 then to para 11-10, page 11-99 and explain.

- b. The system fault isolation chart will direct you to the VDT fault isolation chart.
 - (1) The fault isolation procedure table directs you to the point of entry into the flow chart.
 - (2) You may need to refer to the wiring diagrams for certain problems.

NOTE: Refer to TM 11-5805-790-12-7 para 10-22 page 10-54 for the VDT and para 10-21 page 10-51 for the LPU remove and replace procedures.

4. Remove and replace.

- a. The LPU is a replaceable unit as a whole.
- b. The VDT can be removed as a whole or in parts. Components that may be replaced are:
 - (1) Keyboard.
 - (2) Power supply.
 - (3) Circuit card.
 - (4) Protection module.
 - (5) Key board lamps.

1H

3. Practical exercise. During this practical exercise, evaluate the students ability troubleshoot the LPU and VDT.

- a. Explanation to students.
 - (1) This is a two-part practical exercise. During this practical exercise, you will practice performing troubleshooting procedures that will enable you to locate faults within the VDT or LPU.
 - (2) Part One. Use the AN/TYC-39A; TM 11-5805-790-12 and 34 series manuals; digital multimeter; and Practical Exercise, 150-74G10/D01-LP09-PE to isolate and repair two out of three faults in LPU or VDT within 30 minutes per fault.
 - (3) Part Two. You must correctly answer 14 out of 20 written questions pertaining to LPU and VDT fault isolation and repair within 1 hour 30 minutes.
 - (4) Perform the procedures that are directed and have your instructor evaluate you as you perform each step.
 - (5) Remember to be extremely cautious as you handle the components of the power group. High voltages are present in this equipment.

- (6) When you are finished with the practical exercise, have your instructor grade it for you.
- (7) If what you are required to do is not clear, ask your instructor for clarification.

b. Application by students.

- (1) Part One. Using the AN/TYC-39A, TM 11-5805-790-12 and 34 series manuals: digital multimeter, and Practical Exercise, 150-74G10/D01-LP09-PE the students will isolate and repair two out of three faults in the LPU or VDT.
- (2) Part Two. The students will answer written questions pertaining to LPU and VDT fault isolation and repair.

c. Evaluation. During Part One of this practical exercise, evaluate each student to ensure they have the ability to use the fault isolation flowcharts to isolate and repair faults in the LPU and VDT within 30 minutes per fault. In Part Two, evaluate each student to ensure they can correctly answer at least 14 out of 20 questions pertaining to LPU and VDT fault isolation and repair within 1 hour.

11H 57M

SUMMARY:

During this lesson, you learned to use the LPU and VDT fault isolation flowcharts, and the procedures for removal and replacement of LPU and VDT components. In an actual field environment, these skills will be applied often. Other areas of the message switch will be either directly or indirectly related to these components.

12H

END

This document supports Task Number 113-603-3221 and 113-603-3223.

PRACTICAL EXERCISE ANSWER KEY D01-LP09

1. 135 vdc TM 11-5805-790-12-8 para 11-10 pg 11-107
2. CPU card 1A1A3 TM 11-5805-790-12-8 para 11-10 pg 11-106
3. A16A106 TM 11-5805-790-12-8 para 11-10 pg 11-100
4. KEY BOARD FAILURE TM 11-5805-790-12-8 para 11-10 pg 11-101
5. Replace old card TM 11-5805-790-12-8 para 11-1 pg 11-4
6. 3 TM 11-5805-790-12-8 para 11-10 pg 11-105
7. NO no ESD TM 11-5805-790-12-7 para 10-26 pg 10-67
8. W210 TM 11-5805-790-34-3 pg 6-3
9. TB 26 TM 11-5805-790-34-3 pg 6-12
10. Keyboard, video, TM 11-5805-790-12-7 para 10-22 pg 10-27
Circuit Cards
Power supply
Lamps
Protection module
11. DLPU TM 11-5805-790-12-8 para 12-7 pg 12-34
12. Offline proc TM 11-5805-790-12-8 para 12-7 pg 12-39
13. 760000 TM 11-5805-790-12-8 para 12-7 pg 12-34
14. A19A104 TM 11-5805-790-12-8 para 12-27 pg 12-28
15. Power up Reset TM 11-5805-790-12-8 para 12-27 pg 12-28
16. LP Interrupt missing TM 11-5805-790-12-8 para 12-7 pg 12-34
17. W210 p1/p3 TM 11-5805-790-34-3 pg 6-3
18. LPUA/CB20 TM 11-5805-790-34-3 pg 6-8
19. Combined Mode TM 11-5805-790-12-1 para 1-28 pg 2-81
20. No, printer needed TM 11-5805-790-12-1 para 2-28 pg 2-81

US ARMY SIGNAL CENTER AND FORT GORDON
Fort Gordon, Georgia 30905-5180

LESSON PLAN

TITLE: Security Enhancements

LEARNING

OBJECTIVE: Action: The student will describe the security enhancements of the AN/TYC-39A.

Conditions: The student is given TM-11-5805-790-12-2 and PE.

Standard: The student has met the learning objective when he or she can correctly answer at least 7 out of 10 questions on the Practical Exercise 150-74G10/D01-LP05-PE within 30 minutes.

SAFETY

CONSIDERATIONS: There are no safety considerations for this lesson.

RISK

ASSESSMENT: A risk assessment has been conducted on this unit of instruction and the risk level is deemed to be: LOW RISK.

RESOURCE

NEEDS/

REFERENCES: Overhead Projector, Slides 1-12, chalkboard, TM-11-5805-790-12-2 and 150-74G10/D01-LP05-PE.

METHODS OF

INSTRUCTION: Conference/Performance Exercise.

TIME: 4.0 Hours

NOTES TO INSTRUCTOR:

1. Ensure that the classroom is available and properly set up and that all equipment and training resources are available and in working order.

150-74G10\D01-LP10

1

APPROVAL DATE: 27 NOV 97
DEVELOPER: SFC CARTAGENA
DIV. CHIEF: Jack P. Rendon

2. Ensure that enough technical manuals are available and account for all slides.
3. Before the end of class, evaluate students on their ability to perform the learning objective.
4. State all safety notes as they appear throughout the lesson plan.

INTRODUCTION:

Elapsed Time This lesson will focus on the security logon/logoff procedures, the audit commands, and the responsibilities of the security enhancements of the message switch.

5M

BODY:

1. Object reuse function.

NOTE: Show Slide 1.

- a. Any area of the system (memory or disk), which contains message data, must be cleared as soon as that area becomes available for reuse. In some cases, this involves clearing an area before use. In other cases, the area is a fixed size and is completely overwritten by new data (FINL/DINL).
- b. The AN/TYC-39A uses L-3050V memory, SDUs, DLCP, LCF, and ILIP to store message information of differing security levels. L-3050V memory, SDUs, and floppy disks are used to store security-related database information. In the processing of messages and in the loading of the AN/TYC-39A, storage locations on these media are reused. The AN/TYC-39A clears or overlays all storage areas containing message or security related database information before releasing them for reuse.

2. User types.

NOTE: Show Slide 2.

- a. There are four user types. Each user type is authorized to perform a specific set of commands.

Some commands are authorized for use by more than one user type. The four user types are as follows.

- (1) System Security Officer (SSO).
- (2) Administrator/Supervisor.
- (3) Traffic Service Operator.
- (4) Maintenance.

NOTE: Refer students to TM 11-5805-790-12-2, para 3-2, page 3-2.

- b. Only one user may be logged on a VDT at a time. There is a system limit of 20 users.

NOTE: Recapitulate key points. Ask questions to ensure students' understanding of material covered.

QUESTIONS: What user is authorized to perform the initiate loopback test LPBK command? (ANS: SUPERVISOR or MAINTENANCE.)

In what manual would you find what commands are auditable? (ANS: TM 11-5805-790-12-2.)

How many user types are there and what are they? (ANS: Four, S=SSO, A=Administration/Supervisor, T=Traffic Service M=Maintenance.)

30M

3. Discretionary access function.

NOTE: Show Slide 3.

- a. Discretionary access is based on user type.
- b. Each command has one or more authorized user types.

- c. When a command is entered, the authorized user types for that command are compared with the type of user logged on to the VDT.
- d. If the types match, the command is processed.
- e. If they do not match, the command is NAKed/INVALID RESPONSE.

4. Mandatory access function.

- a. Mandatory Access refers to individual commands and jobs that require functional passwords. When one of these commands or jobs is requested, not only is the user type checked for authorization, but an individual password for that command or job must also be entered. Passwords are required to perform the following functions.
 - (1) Allied/US line classmarks.
 - (2) SDU/memory printouts.
 - (3) ECP authorization.
 - (4) Security authorization.
 - (5) TRC authorization.
 - (6) SPECAT/SHD authorization.
 - (7) Y community/SPECAT/SHD text print.
 - (8) Date modification.
 - (9) SSO related functions.
- b. When a command or job is to be performed, one of these functions is entered, the system requests the entry of the applicable password. If the entry matches the password required for the command or job, the command or job is processed. If they do not match, the command or job is NAKed/aborted. Before echoing the entered command, the password is overlaid with dollar signs.
- c. The SSO maintains the functional password table using the TGEN command PASS.

NOTE: Recapitulate key points. Ask questions to ensure students' understanding of material covered.

QUESTIONS: What happens if the command does not match the user type? (ANS: NAK or INVALID RESPONSE.)

Who maintains the functional password table? (ANS: SSO.)

1H

5. LOGON/LOGOFF.

NOTE: Show Slide 4.

a. Logon to the off-line system.

- (1) This command can be entered by user types SSO, Traffic Service, Administration/Supervisor, and Maintenance Position.
- (2) Upon successful completion of the LGON command, the system displays the date and time of the last successful logon made with the user ID and password in the command response line of the VDT.
- (3) The user is automatically logged off the system after 30 minutes of inactivity or upon entering the LGOF command.
- (4) After three successive unsuccessful logon attempts, the system locks out any further attempts by a user to access the system for 15 minutes.
- (5) LGON is invalid if the VDT has a current user logged-on.
- (6) To logon to the off-line system, perform the following.

- (a) Query:NEXT JOB = ????
- (b) Response:LGON
- (c) Query:ENTER USER ID AND PASSWORD
- (d) Response:xxxx yyyyyyyy\$ where:

1. xxxx =The user's ID
2. yyyyyyyy = The user's password

b. Logon to the on-line system.

NOTES: Show Slide 5.

Refer students to TM 11-5805-790-12-2, para 4-22, pg 4-48 and 4-120 Monitor Service Messages.

- (1) This command is entered by user types SSO, Traffic Service, Administration/Supervisor, and Maintenance Position.
- (2) Upon successful completion of the LGON command, the system displays the date and time of the last successful logon made with the USER ID in the command response line of the VDT.
- (3) The user is automatically logged off the system after 30 minutes of inactivity or upon entering the LGOF command.
- (4) After three successive unsuccessful logon attempts, the system locks out any further attempts by a user to access the system for 15 minutes.
- (5) LGON is invalid if the VDT has a current USER logged on.
- (6) To logon to the on-line system, perform the following. LGON xxxx yyyyyyyy\$ where:
 - (a) xxxx = The user ID
 - (b) yyyyyyyy = The user's password
- (7) EXP System Alarm - This new alarm appears when the user has logged on within the two-day warning period before his user ID expiration.
- (8) If on-line and the VDT closes, the user is automatically logged off.
- (9) Users are automatically logged off after initiating the following jobs: MPLD, MSLD, RECO, LFIM.

c. Logoff the on-line or off-line system.

- (1) This command is entered by user types SSO, Traffic Service, Administration/Supervisor, and Maintenance Position.
- (2) This command must be issued prior to allowing a new user to logon if there is a user currently logged on to the VDT.
- (3) LGOF is invalid if there is no logged-on user on this VDT.
- (4) To logoff the on-line or off-line system, enter the log off command LGOF.

NOTE: Recapitulate key points. Ask questions to ensure students' understanding of material covered.

QUESTION: What error code appears on the VDT when a user reaches the two day warning of expiration? (ANS: EXP.)

What commands is the user automatically logged off when the command completes? (ANS: MPLD, MSLD, RECO, LFIM.)

What happens to the on-line user if the VDT closes? (ANS: The user is logged off.)

1H 45M

6. Print User ID and Passwords.

NOTE: Show Slide 6.

a. On-line printout.

- (1) The on-line STAT PAS command permits the SSO to print out all current on-line functional passwords and all user ID information, to include the following.
 - (a) User ID.
 - (b) Password.
 - (c) Type.
 - (d) Activation and Expiration Dates.
- (2) The printout is preceded and followed by a form feed to keep it separated from all other printouts. The SSO should remove it from the printer immediately

to keep it from being seen by unauthorized personnel.

- (3) To perform the command, enter STAT PAS at the on-line VDT.
- (4) STAT PAS is unchanged except for the following.
 - (a) Required SSO User.
 - (b) No master password supplied.
 - (c) Prints master password.

b. Off-line printout.

- (1) The off-line job PASS permits the SSO to print out all functional passwords and all user ID information, to include the following.
 - (a) User ID.
 - (b) Password.
 - (c) Type.
 - (d) Activation and Expiration Dates.
- (2) The printout is preceded and followed by a form feed to keep it separated from all other printouts.

The SSO should remove it from the printer immediately to keep it from being seen by unauthorized personnel.

- (3) To perform the command, enter PASS at the NEXT JOB prompt on the off-line VDT.
- (4) PASS job prints the user IDs and password rather than the (V)1 version that allowed changing of passwords.

2H

7. Audit function.

NOTES: Show Slide 7.

Refer students to TM 11-5805-790-12-2 paragraph 3-2, page 3-2 and explain what commands are audited.

a. Types of audits.

- (1) On-line command audit - A command audit file is maintained on the control SDU. Every time an auditable on-line command is entered, an entry is made in the audit file. The entry contains the following information.
 - (a) Time.
 - (b) User ID.
 - (c) Type of event.
 - (d) Command origin.
 - (e) A copy of the command.
 - (f) System response to the command.
- (2) Off-line job audit - A paper audit trail is used to audit off-line jobs. All auditable commands entered off-line are numbered sequentially and printed on the LPU. Auditable commands cannot be entered if a printer is not assigned to the off-line function. All off-line jobs are auditable, except for MSLD and those associated with off-line Fault Isolation And Maintenance Functions (LFIM jobs).

b. Audit report printouts.

NOTES: Show Slide 8.

The SSO is responsible for auditing the usage of the auditable commands. The audit reports may provide suspicions of possible compromise of security and indications of misuse or abuse. They may also show abnormalities in system operation which may require corrective action.

- (1) The Audit Report function is used to obtain a printout of a designated portion of the audit file maintained on a control SDU.
- (2) The printout contains those audit file entries created within a time range designated by the SSO.

- (3) The SSO may also request that the audit report be limited to entries for a particular user within the specified time range.
- (4) This function is available both on-line and off-line; however, the off-line function should only be used if the on-line system is not available, since the on-line must be degraded to configure a control SDU to off-line.
- (5) An Audit Report consists of individually generated sections, each of which is printed on a separate printer page for easy access by the SSO.
- (6) The Audit Report is available both off-line and on-line.
 - (a) The On-line Audit Report Program generates a printout based upon the criteria specified in the AUDU/AUDF command, using the contents of the currently active audit file. Only one audit request may be active at any time; subsequent requests are NAKed until the report in progress has been completed. This report may only be requested by the SSO.
 - (b) The Off-line Audit Report job (ARGO) generates a printout of the contents of the audit file that was built on-line on a control disk. Procedurally, this job should only be done if the on-line system is not available.

An Audit Report generated off-line must use information from a control disk that is not currently connected to the on-line system. This job may be performed by user type SSO. Equipment requirements:

- 1. VDT.
- 2. Printer.
- 3. SDU (CONTROL).

2H 45M

c. On-line Audit Report Procedures

NOTE: Show Slide 9.

- (1) Request Audit Report by User (AUDU) -
This command may be entered by user type
SSO. This command generates an Audit
Report for an individual user for the
specified time range.

(a) The format is as follows

AUDU xxxx ddd bbbb yy eee
where:

- a. xxxx = A 4-character User
ID
- b. ddd = Beginning Julian
day for report
- c. bbbb = Beginning time of
the time range for the
report
- d. yy = Ending Julian day
for report
- e. eee = Ending time of the
time range for the report

- (b) Prior to validating the time range
in the command, the system
determines the year associated with
the specified day as follows:

If the command day/time
is less than or equal to
the current system
day/time, it is
considered to be for the
current year; if greater,

it is considered to be
for the previous year.
The actual time range
(including the year) is
then validated to be in
chronological order.

(2) Request Full Audit Report (AUDF) - This command may be entered by user type SSO. This command generates an Audit Report for all users for the specified time range.

(a) The format is as follows:
AUDF ddd bbbb yyy eeee where:

1. ddd = Beginning Julian day for report.
2. bbbb = Beginning time of the time range for the report.
3. yyy = Ending Julian day for report.
4. eeee = Ending time of the time range for the report.

(b) Prior to validating the time range in the command, the system determines the year associated with the specified day as follows:

If the command day/ time is less than or equal to the current system day/time, it is considered to be for the current year; if greater, it is considered to be for the previous year. The actual time range (including the year) is then validated to be in chronological order.

(3) NAK Response - If the AUDU or AUDF command contains a format error, one of the following is displayed to the right of the NAK response.

- (a) INVALID OPTION INDICATOR
- (b) INVALID USER ID FORMAT
- (c) INVALID DATE PARAMETER
- (d) INVALID TIME PARAMETER
- (e) INVALID TIME RANGE

NOTE: Show Slide 10.

- (4) The Audit Report is formatted into individual report pages. Each page consists of 58 lines, the first four lines of which contain header information. A maximum of nine audit entries appears on a report page following the header, with each entry containing six lines. Each report page is sequentially numbered, with the last report page containing the following notice:

***** REPORT COMPLETED *****

- (a) ccc = Switch number
- (b) uuuuuuuuu = All users (for AUDF requests)
- (c) USER: uuuu (for AUDU requests)
- (d) ddd bb:bb = Beginning Julian day/time for report
- (e) yyy ee:ee = Ending Julian day/time for report
- (f) xxxx = ID of user that issued this auditable command
- (g) zz..zz = Event type

- 1. SECURITY
- 2. ROUTING
- 3. SERVICE DENIAL
- 4. USER/PASSWORD

- (h) nnn = Origin of command

- 1. SSF
- 2. TSF
- 3. DBD

d. Off-line Audit Report Procedures

NOTES: Show Slide 11.

- (1) In order to activate the Off-line Audit Report, enter the following.

- (a) At the NEXT JOB prompt, enter ARGO.
- (b) ENTER DEVICE ID FOR SDU ICON - Give the ID of the control SDU to be used for the report. Enter A through F.

- (c) SDU NOT CONTROL - The SDU selected was not a control SDU.
- (d) INVALID CONTROL SDU INFORMATION - Unable to locate start of audit file on SDU. Try other control SDU if available.
- (e) ENTER REPORT COMMAND

NOTE: Show Slide 12.

- (2) Request Audit Report by User (AUDU). This command may be entered by user type SSO. This command generates an Audit Report for an individual user for the specified time range.
 - (a) The format is as follows.
AUDU xxxx ddd bbbb yyy eeee where:
 - 1. xxxx = A 4-character User ID
 - 2. ddd = Beginning Julian day for report
 - 3. bbbb = Beginning time of the time range for the report
 - 4. yyy = Ending Julian day for report
 - 5. eeee = Ending time of the time range for the report
 - (b) Prior to validating the time range in the command, the system determines the year associated with the specified day as follows: if the command day/time is less than or equal to the current system day/time, it is considered to be for the current year; if greater, it is considered to be for the previous year. The actual time range (including the year) is then validated to be in chronological order.
- (3) Request Full Audit Report (AUDF) - This command may be entered by user type SSO. This command generates an Audit Report

for all users for the specified time range.

(a) The format is as follows. AUDF ddd
bbbb yy eeee where:

1. ddd = Beginning Julian day for report.
2. bbbb = Beginning time of the time range for the report
3. yy = Ending Julian day for report
4. eeee = Ending time of the time range for the report

(b) Prior to validating the time range in the command, the system determines the year associated with the specified day as follows: if the command day/ time is less than or equal to the current system day/time, it is considered to be for the current year; if greater, it is considered to be for the previous year. The actual time range (including the year) is then validated to be in chronological order.

(4) COMMAND VALID/PROCEEDING WITH REPORT -
Command has been validated and report generation logic has begun. Report will be printed on the LPU.

NOTE: The on-line and off-line audit reports are identical in format. Reshow B1-13 if necessary.

(a) The command just entered is invalid for one of the following reasons:

1. INVALID OPTION INDICATOR.
2. INVALID USER ID FORMAT.
3. INVALID DATE PARAMETER.
4. INVALID TIME PARAMETER.

5. INVALID TIME RANGE.

- (b) LAST GOOD TIME ENTRY WAS AT ddd hhmmss1 CONTINUING WITH TIME ENTRY ddd hhmmss2 - The last audit event entry that was readable from the Audit File was made on day ddd, time hhmmss1.

The record(s) following it either could not be read or contained corrupted data. File entry made on day ddd, time hhmmss2 was the first valid entry found; processing continues with this data. Intervening entries have been skipped.

- (c) LAST GOOD TIME ENTRY WAS AT ddd hhmmss COMPLETED PROCESSING OF SDU - An audit event entry made day ddd, time hhmmss was read and no more entries on this SDU can be processed.

3H 30M

8. Practical exercise.

a. Explanation to students.

- (1) You must answer 7 out of 10 questions on the security enhancements of the AN/TYC-39A.
- (2) When you are finished with the practical exercise, have your instructor grade it for you.
- (3) If what you are required to do is not clear, ask your instructor for clarification.

b. Application by students. You must answer 7 out of 10 questions correctly on the security enhancements of the AN/TYC-39A.

c. Evaluation. Evaluate each student to ensure they can answer at least 7 out of 10

questions correctly on the security
enhancements of the AN/TYC-39A.

3H 55M

SUMMARY:

In this lesson, we discussed the security
enhancements of the AN/TYC-39A. The written
practical exercise portion of this lesson will
enable you to check and reinforce your
understanding of the material discussed during
this lesson.

4H

END

This document supports Task Number 113-603-2198.

ANSWER KEY TO PRACTICAL EXERCISE

1. Any area of the system (memory or disk) which may contain message data must be cleared as soon as that area becomes available for reuse.
2. Maintaining USER IDs AND TYPES, passwords, and Audit functions
3. Discretionary Access only checks user types, while Mandatory Access checks Command or Job password.
4. PASS.
5. The system will lock out any further attempts by a user to access the system for 15 minutes.
6. The On-line Audit file is maintained on the control SDU used to audit on-line commands. The Off-line Audit is a paper audit trail used to audit off-line jobs.
7. The off-line function should only be used if the On-line System is not available, since the on-line processor must be degraded to configure a Control SDU to off-line processor.
8. AUDU
9. Unable to locate start of Audit File on THE CONTROL SDU
10. ARGO

U.S. ARMY SIGNAL CENTER AND FORT GORDON
Fort Gordon, Georgia 30905-5180

LESSON PLAN

TITLE: Performance Examination

LEARNING

OBJECTIVE: Action: The student will fault isolate and answer written questions on the initialization and power group.

Conditions: The student will be given a problem scenario and an AN/TYC-39A with one induced malfunction; TM 11-5805-790-12 and 34 series, tool kit, oscilloscope, multimeter, and student test sheets. The student will not use personal notes or any additional training material.

Standard: Acceptable performance is reached when the student has answered 14 out of 20 questions within 60 minutes, and has isolated two of three malfunctions 30 minutes per fault.

SAFETY

CONSIDERATIONS: This lesson has safety hazards which may cause electrical shock or physical injury. Emphasis will be placed on the precautions that are found in the lesson plans.

RISK

ASSESSMENT: A risk assessment has been conducted on this unit of instruction and the risk level is deemed to be: LOW RISK.

RESOURCE

NEEDS/

REFERENCES: AN/TYC-39A, TM 11-5805-790-12 and 34 series, tool kit, Criterion Test Instructions, multimeter, oscilloscope, and student test sheets.

METHOD OF

INSTRUCTION: Examination.

150-74G10\D02-LP01

1

APPROVAL DATE: 27 NOV 97

DEVELOPER: SFC CARTAGENA

DIV. CHIEF: Jack P. Rendon

TIME: 14 Hours

CAUTION

MAKE SURE STUDENTS REMOVE ALL JEWELRY AND METAL OBJECTS SUCH AS WATCHES, RINGS, BRACELETS, AND IDENTIFICATION TAGS BEFORE THE OPERATION OF ANY ELECTRICAL EQUIPMENT.

NOTE TO INSTRUCTOR:

Secure a copy of the criterion test instructions and familiarize yourself with the "Directions to Administrator" section.

INTRODUCTION:

Elapsed 1. The performance examination you are about to take
Time covers malfunction analysis of the CIG group.

2. You will be tested on your ability to isolate problems using available tools and test equipment.

10M

BODY:

1. Administer examination IAW criterion test instructions.

2. Critique the examination.

a. Critique the test after it has been completed.

b. Answer all student questions.

13H 55M

SUMMARY:

During the last 13 hours, you have been tested on your ability to isolate malfunctions on the power group.

14H

END

This document supports Task Numbers 113-603-2198, 113-603-3215, 113-603-1048, 113-603-3223 and 113-603-3225.